

ZS 1A.

THIS BOOK MAY NOT BE PHOTOCOPIED



PROCEEDINGS

OF THE

SCIENTIFIC MEETINGS.

OF THE

ZOOLOGICAL SOCIETY

OF LONDON

FOR THE YEAR

1878.



PRINTED FOR THE SOCIETY,

AND SOLD AT THEIR HOUSE IN HANOVER SQUARE.

LONDON:

MESSRS. LONGMANS, GREEN, READER, AND DYER,
PATERNOSTER ROW.

LIST

OF THE

COUNCIL AND OFFICERS

OF THE

ZOOLOGICAL SOCIETY OF LONDON.

1878.

COUNCIL.

THE MARQUIS OF TWEEDDALE, F.R.S., *President.*

THE LORD ABINGER.

GEORGE BUSK, Esq., F.R.S.

MAJOR-GEN. HENRY CLERK, R.A.,
F.R.S.

ROBERT DRUMMOND, Esq., *Treasurer.*

PROFESSOR FLOWER, F.R.S., *Vice-President.*

JOHN P. GASSIOTT, Jun., Esq.

REAR ADMIRAL THE COUNT GLEICHEN, R.N.

F. DUCANE GODMAN, Esq.

ARTHUR GROTE, Esq.

EDMUND W. H. HOLDSWORTH, Esq.

ROBERT HUDSON, Esq., F.R.S.,
Vice-President.

PROFESSOR MIVART, F.R.S.

PROFESSOR NEWTON, F.R.S., *Vice-President.*

HENRY POLLOCK, Esq.

LIEUT.-COL. SIR CHARLES RUSSELL, Bart., M.P.

OSBERT SALVIN, Esq., F.R.S.

PHILIP LUTLEY SCLATER, Esq.,
M.A., Ph.D., F.R.S., *Secretary.*

JOSEPH TRAVERS SMITH, Esq.

RICHARD H. S. VYVYAN, Esq.

THE LORD WALSHINGHAM.

PRINCIPAL OFFICERS.

Office, 11 Hanover Square, W.

P. L. SCLATER, Esq., Ph.D., F.R.S., *Secretary.*

MR. F. H. WATERHOUSE, *Librarian.*

MR. W. J. WILLIAMS, *Clerk.*

Gardens, Regent's Park, N. W.

MR. A. D. BARTLETT, *Superintendent.*

PROFESSOR GARROD, F.R.S., *Prosector.*

LIST

OF THE

CONTRIBUTORS,

With References to the several Articles contributed by each.

	Page
ALSTON, EDWARD R., F.L.S., F.Z.S., &c.	
Note on the Dentition of <i>Cuscus</i>	274
Exhibition, on behalf of Dr. Elliott Coues, C.M.Z.S., of two specimens of <i>Synaptomys cooperi</i> , Bd.	633
On the Squirrels of the Neotropical Region. (Plate XLI.)	656
Supplementary Note on the Neotropical Squirrels	954
ANDERSON, ANDREW, F.Z.S.	
Letter from, concerning <i>Falco babylonicus</i> , figured in the Society's 'Proceedings' for 1876	2
On a new Species of Indian <i>Prinia</i> . (Plate XIX.)	370
Exhibition of a Bamboo driving-stick taken from the nest of an Indian Eagle.	393
ANGAS, GEORGE FRENCH, F.L.S., F.R.G.S., C.M.Z.S., &c.	
Descriptions of seven new Species of Land-Shells recently collected in Costa Rica by Mr. Adolphe Boucard. (Plate V.)	72
Description of a new Species of <i>Latiavis</i> . (Plate V.) . .	74
Description of a new Genus of Land-Shells belonging to the Family Cyclophoridae	310

	Page
Descriptions of nine new Species of Land and Marine Shells from various localities. (Plate XVIII.)	311
Description of a new Species of <i>Tudicula</i>	610
Descriptions of six Species of Bivalve Shells in the Collection of Mr. Sylvanus Hanley, F.L.S., and of a <i>Helix</i> from the Solomon Islands. (Plate LIV.)	859
Descriptions of ten Species of Marine Shells from the Province of South Australia. (Plate LIV.)	861
A List of additional Species of Marine Mollusca to be included in the Fauna of the Province of South Australia, with Notes on their Habitats and Local Distribution	864
 BARBOZA DU BOCAGE, Professor JOSÉ VICENTE, Director of the National Museum, Lisbon, F.M.Z.S.	
Liste des Antilopes d'Angola	741
 BARTLETT, A. D., Superintendent of the Society's Gardens.	
Letter from, relating to the alleged existence of <i>Anoa depressicornis</i> in the Philippines	882
 BATES, H. W., F.L.S., F.Z.S.	
On new Genera and Species of Geodephagous Coleoptera from Central America	587
On new Species of Coleopterous Insects (Geodephaga and Longicornia) taken by Dr. Stoliczka during the Forsyth Expedition to Kashgar in 1873-74	713
 BEDDOME, Lieut.-Col. R. H., C.M.Z.S.	
Description of a new Genus of Tree-Lizards from the higher Ranges of the Anamallays. (Plate XIV.)	153
Descriptions of new Uropeltidæ from Southern India, with Remarks on some previously described Species	154
Description of a new Genus of Snakes of the Family <i>Calamariidæ</i> , from Southern India	576
Description of a new Batrachian from Southern India, belonging to the Family Phryniscidæ	722

Description of six new Species of Snakes of the Genus
Silybura, Family Uropeltidæ, from the Peninsula of India.. 800

BOCK, CARL, F.G.S. &c.

Descriptions of two new Species of Shells from China and
Japan. (Plate XLVI., figs. 1-3.) 727

BOUCARD, ADOLPHE, C.M.Z.S.

On Birds collected in Costa Rica. (Plate IV.) 37

Notes on some Coleoptera of the Genus *Plusiotis*, with
Descriptions of three new Species from Mexico and Central
America. (Plate XVI.) 293

BROOKE, Sir VICTOR, Bart., F.Z.S.

On *Gazella granti*..... 723

On the Classification of the *Cervidæ*, with a Synopsis of
the existing Species. (Plate LV.) 883

On a new Species of Gazelle from Eastern Africa.
(Plate LVI.) 929

BURMEISTER, Dr. HERMANN, Diretor of the National Museum,
Buenos Aires, F.M.Z.S.

Notes on *Conurus hilaris* and other Parrots of the Argen-
tine Republic..... 75

BUTLER, ARTHUR GARDINER, F.L.S., F.Z.S., Assistant, Zoo-
logical Department, British Museum.

On a small Collection of Lepidoptera obtained by the Rev.
J. S. Whitmee at the Ellice Islands 296

Description of new Lepidoptera of the Group Bombycites,
in the Collection of the British Museum 381

On a small Collection of Lepidoptera from Jamaica. 480

Description of a new Species of the Orthopterous Genus
Phylloptera from Madagascar 648

Description of a Remarkable new Spider from Madagascar 799

CHEESEMAM, S. T., F.L.S., Curator of the Auckland Museum.

Descriptions of three new Species of Opisthobranchiate
Mollusca from New Zealand. (Plate XV.)..... 275

CLARK, JOHN W., M.A., F.Z.S.

Notes on three stuffed Specimens of the Sea-lion of the Pri-
bilov Islands (*Otaria ursina*). (Plate XX.) 371

COLLETT, ROBERT, C.M.Z.S.

On *Latrunculus* and *Crystallogobius*, two remarkable Forms
of Gobioid Fishes 318

COUES, DR. ELLIOTT, C.M.Z.S. (See ALSTON, EDWARD R.)

DAY, Surgeon-Major FRANCIS, F.Z.S. &c.

Remarks on Mr. Whitmee's paper on the Manifestation of
Fear and Anger in Fishes 214

Exhibition of, and remarks upon three jaws of Indian
Sharks 976

DOBSON, G. E., M.A., M.B., F.L.S., &c.

Additional Notes on the Chiroptera of Duke-of-York Island
and the adjacent Parts of New Ireland and New Britain 314

Notes on *Myxopoda aurita*, Milne-Edw. 871

Notes on recent Additions to the Collection of Chiroptera
in the Muséum d'Histoire Naturelle at Paris, with Descrip-
tions of New and Rare Species 873

DRUCE, HERBERT, F.L.S., GODMAN, FREDERICK DU CANE,
and SALVIN, OSBERT, M.A., F.R.S.

Catalogue of Lepidoptera collected by Mr. S. N. Walter
in the Island of Billiton. (Plate XL.) 637

ELLIOT, DANIEL G., F.R.S.E., F.L.S., F.Z.S., &c.

A Study of the Pteroclidæ or Family of the Sand-Grouse 233

On the Fruit-Pigeons of the Genus *Ptilopus*. (Plates
XXXIII. & XXXIV.) 500

EVERETT, A. H.

- Letter from, addressed to the Marquis of Tweeddale, concerning the occurrence of *Anoa depressicornis* in the Philippines 792

FINSCH, OTTO, Ph.D., C.M.Z.S., &c., Director of the Bremen Museum.

- On a new Species of Finch from the Feejee Islands. (Plate XXIX.) 440

- On a new Species of Starling..... 712

FLOWER, WILLIAM HENRY, LL.D., F.R.S., F.L.S., V.P.Z.S.,
Conservator of the Museum of the Royal College of Surgeons, and Hunterian Professor.

- On the Skull of a Rhinoceros (*R. lasiotis*, Schl. ?) from India 634

FORBES, WILLIAM ALEXANDER, F.Z.S.

- Reports on the Collections of Birds made during the Voyage of H.M.S. 'Challenger.'—No. VII. On the Birds of Cape York and the neighbouring Islands (Raine, Wednesday, and Booby Islands) 120

- On a small Collection of Birds from the Samoan Islands and the Island of Rotumah, Central Pacific. 351

GARROD, ALFRED HENRY, B.A., F.R.S., F.Z.S., Fellow of St. John's College, Cambridge, Prosector to the Society.

- On the Systematic Position of the Momotidæ 100

- Note on the Gizzard and other Organs of *Carpophaga latrans* 102

- Note on the Anatomy of the Binturong (*Arctictis binturong*) 142

- Notes on the Anatomy of Passerine Birds.—Part IV..... 143

- Notes on the Anatomy of *Tolypeutes tricinctus*, with Remarks on other Armadillos 222

- Notes on the Visceral Anatomy of *Lycaon pictus*, and of *Nyctereutes procyonides* 373

- On the Trachea of *Tantalus loculator* and of *Vanellus cayennensis*..... 625

- On the Anatomy of the Maleo (*Megacephalon maleo*).... 629

Notes on Points in the Anatomy of Levaillant's Darter (<i>Plotus levaillanti</i>)	679
Notes on the Anatomy of <i>Indicator major</i>	930
GARROD, ALFRED HENRY, B.A., F.R.S., and TURNER, WILLIAM, M.B., F.R.S.	
On the Gravid Uterus and Placenta of <i>Hyomoschus aqua- ticus</i> . (Plate XLIV.)	682
GEDDES, P.	
Notice of a memoir on the Mechanism of the Odontophore in certain Mollusca	212
GODMAN, FREDERICK DUCANE, F.L.S., F.Z.S., and SALVIN, OSBERT, M.A., F.R.S., F.Z.S.	
Descriptions of nineteen new Species of Diurnal Lepido- ptera from Central America	264
Descriptions of new Species of Central-American Butter- flies of the Family Erycinidæ	360
List of the Butterflies collected in Eastern New Guinea and some neighbouring Islands by Dr. Comrie during the Voyage of H.M.S. 'Basilisk.' (Plate XL.)	643
Descriptions of some apparently new Species of Butterflies from New Ireland and New Britain, sent by the Rev. G. Brown	733
GODMAN, FREDERICK DU CANE, SALVIN, OSBERT, M.A., F.R.S., and DRUCE, HERBERT, F.L.S.	
Catalogue of Lepidoptera collected by Mr. S. N. Walter in the Island of Billiton. (Plate XL.)	637
GÜNTHER, ALBERT, M.D., Ph.D., F.R.S., V.P.Z.S., Keeper of the Zoological Department, British Museum.	
On Reptiles from Midian collected by Major Burton. (Plate LXII.)	977
GURNEY, JOHN HENRY, F.Z.S.	
Letter on a supposed example of <i>Falco babylonicus</i>	2
Notes on a Specimen of <i>Polyborus</i> lately living in the Society's Gardens	230
Remarks upon the Habits of <i>Asturina monogrammica</i> ..	791

HARTLAUB, Dr. G., F.M.Z.S.

On a new Species of *Notauges* (*N. hildebrandti*, Cab.) . . 721

HOLMWOOD, F.

Remarks upon a young specimen of Temminck's *Manis*
(*Manis temmincki*) 632

HUXLEY, THOMAS H., LL.D., Sec.R.S., V.P.Z.S.

On the Classification and the Distribution of the Crayfishes 752

IRBY, Col. L. H. LOYD, F.Z.S.

Exhibition of nests, eggs, and young of *Cypselus pal-*
lidus 976

JACOBY, MARTIN.

Descriptions of new Species of Phytophagous Coleoptera. 144

Descriptions of new Species of Phytophagous Coleoptera
from Central and South America 982

JEFFREYS, J. GWYN, LL.D., F.R.S., F.Z.S.

On the Mollusca procured during the 'Lightning' and
'Porcupine' Expeditions, 1868-70. (Part I.) (Plates XXII.
& XXIII.) 393

LANKESTER, Prof. E. RAY, M.A., F.R.S.

Notice of a memoir on the Hearts of *Ceratodus*, *Proto-*
pterus, and *Chimæra*. 634

LAYARD, E. L., C.M.G., F.Z.S., &c., H.B.M. Consul in New
Caledonia.

Letter from, addressed to the Secretary, concerning *Glycy-*
phila fasciata and *Petræca kleinschmidtii* 655

LODER, EDMUND GILES, F.Z.S.

Exhibition of a head of a peculiar variety of *Bos americanus* 392

MEYER, Dr. A. B., Director of the Royal Zoological Museum,
Dresden, C.M.Z.S.

Letter from, addressed to the Secretary, respecting a new
Bird of Paradise. 792

Letter from, concerning the supposed existence of the Anoa
(*Anoa depressicornis*) in the Philippines 881

MIERS, EDWARD J., F.L.S., F.Z.S., Assistant in the Zoological
Department, British Museum.

Notes on the *Penæidæ* in the Collection of the British
Museum, with Descriptions of some new Species. (Plate
XVII.) 298

MIVART, St. GEORGE, Ph.D., F.R.S., F.Z.S., M.R.I., &c.

Notice and abstract of a memoir on the Fins of Elasmo-
branchs, with Considerations on the Nature and Homologies
of Vertebrate Limbs 116

MOORE, FREDERIC, F.Z.S., Assistant Curator, India Museum,
London.

A Revision of certain Genera of European and Asiatic Li-
thosiidæ, with Characters of new Genera and Species.
(Plates I.-III.) 3

Descriptions of new Asiatic Hesperidæ. (Plate XLV.) . . 686

List of Lepidopterous Insects collected by the late R.
Swinhoe in the Island of Hainan 695

A List of the Lepidopterous Insects collected by Mr. Ossian
Limborg in Upper Tenasserim, with Descriptions of new
Species. (Plates LI.-LIII.) 821

NEWTON, ALFRED, M.A., F.L.S., F.Z.S., Professor of Zoology
and Comparative Anatomy in the University of Cam-
bridge.

Exhibition of, and remarks upon, a stone supposed to be
from the gizzard of *Pezophaps solitaria* 291.

Exhibition of, and remarks upon, a supposed hybrid between
the Red Grouse and the Ptarmigan 793

NICHOLSON, FRANCIS, F.Z.S.

- On a Collection of Birds from Abeokuta. (Plate X.) . . . 128
- A List of the Birds collected by Mr. E. C. Buxton at
Darra-Salam, on the coast of Africa opposite Zanzibar . . . 353
- On an apparently new Species of American Pipit. 390

OUSTALET, EMILE, C.M.Z.S.

- Description d'une nouvelle espèce de Casoar (*Casuarus
edwardsi*). (Plate XXI.) 389

OWEN, Prof. Richard, C.B., D.C.L., F.R.S., F.L.S., F.Z.S., &c.

- On the Relative Positions to their Constructors of the
Chambered Shells of Cephalopods (Plate LX.) 955

PARKER, T. JEFFERY, Assoc. R.S.M.

- Remarks upon the stridulating organ of the Common
Rock-Lobster. 292

- Note on the Stridulating Organ of *Palinurus vulgaris*.
(Plate XXX.) 442

SALVADORI, COUNT THOMAS, M.D., C.M.Z.S.

- Reports on the Collections of Birds made during the Voyage
of H.M.S. 'Challenger.'—No. VI. On the Birds of Ternate,
Amboyna, Banda, the Ké Islands, and the Aru Islands . . . 78

SALVIN, OSBERT, M.A., F.R.S., F.Z.S.

- Reports on the Collections of Birds made during the
Voyage of H.M.S. 'Challenger.'—No. XII. The Procella-
riidæ 735

SALVIN, OSBERT, M.A., F.R.S., F.Z.S., and GODMAN, FRE-
DERICK DU CANE, F.L.S., F.Z.S.

- Descriptions of nineteen new Species of Diurnal Lepido-
ptera from Central America 264

- Descriptions of new Species of Central-American Butter-
flies of the Family Erycinidæ 360

List of the Butterflies collected in Eastern New Guinea and some neighbouring Islands by Dr. Comrie during the Voyage of H.M.S. 'Basilisk.' (Plate XL.)	643
Descriptions of some apparently new Species of Butterflies from New Ireland and New Britain, sent by the Rev. G. Brown.	733
SALVIN, OSBERT, M.A., F.R.S., GODMAN, FREDERICK DU CANE, and DRUCE, HERBERT, F.L.S.	
Catalogue of Lepidoptera collected by Mr. S. N. Walter in the Island of Billiton. (Plate XL.)	637
SALVIN, OSBERT, M.A., F.R.S., F.Z.S., and SCLATER, P. L., M.A., Ph.D., F.R.S.	
On the Collection of Birds made by Prof. Steere in South America. (Plates XI.-XIII.)	135
Reports on the Collections of Birds made during the Voyage of H.M.S. 'Challenger.'—No. IX. On the Birds of Antarctic America	431
Descriptions of three new Species of Birds from Ecuador. (Plates XXVII. & XXVIII.)	438
Reports on the Collections of Birds made during the Voyage of H.M.S. 'Challenger.'—No. XI. On the Steganopodes and Impennes	650
SAUNDERS, HOWARD, F.L.S., F.Z.S.	
On the <i>Larinæ</i> or Gulls	155
Exhibition of, and remarks upon, some Indian Eggs	976
SCLATER, PHILIP LUTLEY, M.A., Ph.D., F.R.S., Secretary to the Society.	
Report on the additions to the Society's Menagerie in December 1877	1
Report on the additions to the Society's Menagerie in January 1878.	115
Exhibition of, and remarks upon, a skin of a Cassowary in the collection of the British Museum	212
Report on the additions to the Society's Menagerie in February 1878	289

	Page
Exhibition of, and remarks on, a Second Collection of Birds from Duke-of-York Island, New Britain, and New Ireland, received from the Rev. G. Brown, C.M.Z.S.	289
Exhibition of, and remarks upon, the typical specimen of <i>Ninox solomonis</i> , Sharpe	290
Exhibition of a Coot, probably the typical specimen of <i>Fulica gallinuloides</i>	291
Exhibition of, and remarks upon, the type specimen of <i>Dicrurus marginatus</i> of Blyth	339
Reports on the Collections of Birds made during the Voyage of H.M.S. 'Challenger.'—No. VIII. On the Birds of the Sandwich Islands	346
Report on the additions to the Society's Menagerie in March 1878	377
Exhibition of, and remarks upon, a typical specimen of a new Fox (<i>Vulpes cana</i>)	392
Report on the additions to the Society's Menagerie in April 1878.....	441
Further Remarks on <i>Fuligula nationi</i> . (Plate XXXII.)..	477
Reports on the Collections of Birds made during the Voyage of H.M.S. 'Challenger.'—No. X. On the Birds of the Atlantic Islands and Kerguelen's Land, and on the Miscellaneous Collections	576
Report on the additions to the Society's Menagerie in May 1878, and Remarks on <i>Tapirus roulini</i> . (Plate XXXIX.)	631
Remarks upon the living examples of <i>Ciconia maguari</i> and <i>Ciconia episcopus</i> now in the Society's Gardens	633
Note on a second specimen of <i>Felis lancea</i>	655
Notice of a supplementary memoir on the Curassows (Cra- cidæ)	656
On a third Collection of Birds made by the Rev. G. Brown, C.M.Z.S., in the Duke-of-York Group of Islands and its vicinity. (Plate XLII.)	670

	Page
Report on the additions to the Society's Menagerie in June, July, August, September, and October 1878.....	788
Notice of some hybrid Monkeys lately born in the Society's Menagerie	791
Exhibition of, and remarks upon, a specimen of <i>Saxicola stapazina</i> killed in Lancashire	881
Report on the additions to the Society's Menagerie in November 1878. (Plate LXI.) ..	975
Further remarks on the occurrence of <i>Saxicola stapazina</i> in Lancashire.....	977
Notice of an error in the last Part of the Society's Proceedings	977
SCLATER, P. L., M. A., Ph.D., F.R.S., and SALVIN, OSBERT, M.A., F.R.S., F.Z.S.	
On the Collection of Birds made by Prof. Steere in South America. (Plates XI.—XIII.)	135
Reports on the Collections of Birds made during the Voyage of H.M.S. 'Challenger.'—No. IX. On the Birds of Antarctic America	431
Descriptions of three new Species of Birds from Ecuador (Plates XXVII. & XXVIII.)	438
Reports on the Collections of Birds made during the Voyage of H.M.S. 'Challenger.'—No. XI. On the Steganopodes and Impennes	650
SEEBOHM, HENRY, F.Z.S.	
Exhibition of and remarks upon a large series of skins of the Hooded and Carrion Crows.	976
On a new Species of <i>Sylvia</i> from Abyssinia, and on some other Abyssinian Sylviens	978
On the Identity of <i>Horornis fortipes</i> , Hodgs., <i>Neornis assimilis</i> , Gray, <i>Horeites robustipes</i> , Swinhoe, <i>Horeites pallidus</i> , Brooks, and <i>Horeites brunnescens</i> , Hume.....	980

**SHARPE, R. BOWDLER, F.L.S., F.Z.S., &c., Senior Assistant,
Zoological Department, British Museum.**

On a new Species of *Indicator*, with Remarks on other
Species of the Genus 793

A Note on *Pæoptera lugubris*, Bp. (Plate XLIX.) 802

**SHARPE, R. BOWDLER, F.L.S., F.Z.S., and WHITMEE, REV.
S. J., C.M.Z.S.**

On a small Collection of Birds from the Ellice Islands,
with a Note on other Birds found there 271

**SMITH, EDGAR A., F.Z.S., Zoological Department, British
Museum.**

Description of a new Species of *Helix* from Japan 105

Descriptions of new Land-Shells from Japan and Borneo.. 495

Descriptions of five new Shells from the Island of Formosa
and the Persian Gulf, and Notes upon a few known Species.
(Plate XLVI. figs. 4-14.) 728

On a Collection of Marine Shells from the Andaman
Islands. (Plate L.) 804

SOWERBY, G. B., Jun.

Descriptions of ten new Species of Shells. (Plate XLVIII.) 795

**TURNER, WILLIAM, M.B., F.R.S., and GARROD, A.H., M.A.,
F.R.S.**

On the Gravid Uterus and Placenta of *Hyomoschus aqua-
ticus*. (Plate XLIV.) 682

**TWEEDDALE, ARTHUR, Marquis of, F.R.S., President of the
Society.**

Contributions to the Ornithology of the Philippines.—No.
IV. On the Collection made by Mr. A. H. Everett in the
Islands of Dinagat, Bazol, Nipah, and Sakuyok. (Plates
VI.-VIII.) 106

	Page
On a new Philippine Genus and Species of Bird. (Plate IX.)	114
On a new Species of the Genus <i>Buceros</i>	277
Contributions to the Ornithology of the Philippines.—No. V. On the Collection made by Mr. A. H. Everett in the Island of Negros	280
Contributions to the Ornithology of the Philippines.— No. VI. On the Collection made by Mr. A. H. Everett in the Island of Leyte	339
Contributions to the Ornithology of the Philippines.—No. VII. On the Collection made by Mr. A. H. Everett in the Island of Panaon	379
Contributions to the Ornithology of the Philippines.— No. VIII. On some Luzon Birds in the Museum at Darm- stadt. (Plate XXVI.)	429
Contributions to the Ornithology of the Philippines.— No. IX. On the Collection made by Mr. A. H. Everett in the Island of Palawan. (Plates XXXVII. & XXXVIII.) . .	611
Contributions to the Ornithology of the Philippines.— No. X. On the Collection made by Mr. A. H. Everett in the Island of Bohol	708
Correction of an error in his last paper on Philippine Birds	792
Contributions to the Ornithology of the Philippines.— No. XI. On the Collection made by Mr. A. H. Everett at Zamboanga, in the island of Mindanao. (Plates LVII.—LIX.)	936
 WATSON, M., M.D., Professor of Anatomy, The Owens College, Manchester.	
On the Male Generative Organs of <i>Hyæna crocuta</i> . (Plates XXIV. & XXV.)	416
On the Male Generative Organs of <i>Chlamydomorphus</i> <i>truncatus</i> and <i>Dasypus sexcinctus</i> . (Plate XLIII.)	673

WESTWOOD, Professor J. O.

- Notice of a memoir containing a synopsis of the Uraniidæ,
a family of Lepidopterous Insects, together with a complete
monograph of *Coronilia*, one of the genera of which it is
composed 393

WHITE, F. BUCHANAN, M.D., F.L.S.

- Contributions to a Knowledge of the Hemipterous Fauna of
St. Helena, and Speculations on its Origin. (Plate XXXI.) 444

WHITMEE, Rev. S. J., C.M.Z.S.

- On the Manifestation of Anger, Fear, and other Passions
in Fishes, and on the Use of their Spines 132
- Reply to Mr. Day's remarks on his paper on the Manifes-
tation of Fear and Anger in Fishes 221

WHITMEE, Rev. S. J., C.M.Z.S., and SHARPE, R. BOWDLER,
F.L.S., F.Z.S., &c.

- On a small Collection of Birds from the Ellice Islands, with
a Note on other Birds found there 271

WOOD-MASON, J., F.Z.S.

- On new and little-known *Mantidæ*. (Plates XXXV. &
XXXVI.) 580
- On the Structure and Development of the Trachea in the
Indian Painted Snipe (*Rhynchæa capensis*). (Plate XLVII.) 745

LIST OF PLATES.

1878.

Plate		Page
I.		
II.	Asiatic <i>Lithosiidæ</i>	3
III.		
IV.	<i>Zonotrichia vulcani</i>	37
V.	New Shells from Costa Rica	72
VI.	<i>Ceyx argentata</i>	
VII.	Fig. 1. <i>Hypothymis cælestis</i> . Fig. 2. <i>Mixornis capitalis</i>	106
VIII.	Fig. 1. <i>Dicæum schistaceum</i> . Fig. 2. <i>Dicæum everetti</i>	
	Fig. 3. <i>Prionochilus olivaceus</i>	
IX.	<i>Dasycrotapha speciosa</i>	114
X.	<i>Amadina sharpii</i>	128
XI.	<i>Myiarchus semirufus</i>	
XII.	<i>Capito steerii</i>	135
XIII.	<i>Crypturus transfasciatus</i>	
XIV.	<i>Lophosalea anamallayana</i>	153
XV.	New Opisthobranchiate Mollusca	275
XVI.	New Species of <i>Plusiotis</i>	293
XVII.	New Species of <i>Penæidæ</i>	298
XVIII.	New Shells from Kurrachi, Madagascar, Ecuador, and Australia	311
XIX.	<i>Prinia poliocephala</i>	
XX.	<i>Otaria ursina</i> : 1, ♂; 2, ♀; 3, juv.	371
XXI.	<i>Casuaris edwardsi</i>	389
XXII.	Brachiopoda of the 'Lightning' and 'Porcupine' expeditions	393
XXIII.		
XXIV.	Anatomy of <i>Hyæna crocuta</i>	416
XXV.		
XXVI.	<i>Pitta kochi</i>	429
XXVII.	<i>Neomorphus radiolosus</i>	438
XXVIII.	<i>Aranides calopecterus</i>	
XXIX.	<i>Amblynura kleinschmidti</i>	440

Plate		Page
XXX.	Stridulating Organ of <i>Palinurus</i>	442
XXXI.	<i>Hemiptera</i> of St. Helena	444
XXXII.	<i>Fuligula nationi</i>	477
XXXIII.	<i>Ptilopus pictiventris</i>	500
XXXIV.	<i>Ptilopus gestroi</i>	
XXXV. } XXXVI. }	New Mantidæ	580
XXXVII.	<i>Tiga everetti</i>	
XXXVIII.	<i>Trichostoma rufifrons</i>	611
XXXIX.	<i>Tapirus roulini</i>	
XL.	New Lepidoptera	632
XLI.	<i>Sciurus pusillus</i>	637
XLII.	<i>Carpophaga melanochoa</i>	656
XLIII.	Anatomy of <i>Chlamydophorus truncatus</i>	670
XLIV.	Anatomy of <i>Hyomoschus</i>	673
XLV.	New Asiatic <i>Hesperidæ</i>	682
XLVI.	New and other Shells from various localities	686
XLVII.	Trachea of <i>Rhynchæa bengalensis</i>	727
XLVIII.	New Shells	745
XLIX.	<i>Pæoptera lugubris</i>	795
L.	Shells of the Andaman Islands	802
LI. } LII. } LIII. }	Lepidoptera from Upper Tenasserim	804
LIV.	New Shells	
LV.	Classification of the <i>Cervidæ</i>	
LVI.	Skull of <i>Gazella walleri</i>	859
LVII.	<i>Accipiter stevensoni</i>	883
LVIII.	<i>Pseudoptynx gurneyi</i>	
LIX.	<i>Chætura picina</i>	929
LX.	Chambered shells of Cephalopods	
LXI.	<i>Ara spixi</i>	955
LXII.	<i>Zamenis elegantissimus</i>	976
		977

LIST OF WOODCUTS.

1878.

	Page
Syrinx of <i>Momotus lessoni</i>	101
Interior of the gizzard of <i>Carpophaga latrans</i>	103
Syrinx of <i>Carpophaga latrans</i>	104
<i>Helix</i> (<i>Camena</i>) <i>congener</i>	106
Heads of <i>Oryzoborus crassirostris</i> and <i>O. atrirostris</i>	136
Three outer primaries of <i>Larus novæ-hollandiæ</i> , jr.	185
Three outer primaries of <i>Larus novæ-hollandiæ</i> , ad.	186
Three outer primaries of <i>Larus novæ-hollandiæ</i> , old.....	187
Three first primaries of <i>Larus scopulinus</i> , old	188
Three first primaries of <i>Larus hartlaubi</i> , ad.	189
Three outer primaries of <i>Larus bulleri</i> , old	190
Three outer primaries of <i>Larus bulleri</i> , nearly ad.	191
Three outer primaries of <i>Larus gelastes</i> , juv.....	192
Three outer primaries of <i>Larus serranus</i> , ad.	196
Three outer primaries of <i>Larus brunneicephalus</i> , ad.	197
Three outer primaries of <i>Larus melanocephalus</i> , jr.	199
Three outer primaries of <i>Larus ridibundus</i> , jr.	201
Three outer primaries of <i>Larus maculipennis</i> , old.....	202
Three outer primaries of <i>Larus glaucodes</i> , old	203
Three outer primaries of <i>Larus saundersi</i> , ad.	205
Three outer primaries of <i>Larus philadelphicæ</i>	207
Head of <i>Casuaris salvadorii</i>	213
Cephalic shields of <i>Tolypeutes tricinctus</i> , <i>T. conurus</i> , and <i>T. muriei</i> . ..	223
Brain of <i>Tolypeutes tricinctus</i>	226
Brain of <i>Xenurus uncinatus</i>	229
Head of <i>Buceros mindanensis</i>	278
Head of <i>Buceros semigaleatus</i>	279
Head of <i>Phyllorhina cervina</i>	317
Head of <i>Phyllorhina galerita</i>	317
<i>Latrunculus pellucidus</i> ♂ ad.	319
Head of <i>Latrunculus pellucidus</i> , mature male, magnified	323
<i>Crystallogobius nilsoni</i> , mature male	331

	Page
Snout of mature male of <i>Crystallogobius nilssoni</i>	335
Cæcum of <i>Nyctereutes procyonides</i>	375
Wings of <i>Barsinella mirabilis</i>	385
Trachea of <i>Fuligula nationi</i> ♂	478
<i>Helix</i> (<i>Camena</i>) <i>lewisii</i>	496
<i>Helix</i> (<i>Camena</i>) <i>congenita</i>	497
<i>Cyclophorus</i> (<i>Myxostoma</i>) <i>bathyraphe</i>	498
First primaries of the genus <i>Ptilopus</i>	508
First primary and foot of <i>Ptilopus iogaster</i>	510
First primary and foot of <i>Ptilopus fasciatus</i>	510
First primary and foot of <i>Ptilopus geelvinckianus</i>	511
First primary and foot of <i>Ptilopus coronulatus</i>	511
Wing of <i>Drepanoptila holosericea</i>	513
<i>Tudicula inermis</i>	610
Lower end of the trachea of <i>Tantalus loculator</i> ♂	626
Windpipe of <i>Vanella cayennensis</i>	628
Lower larynx of <i>Megalocephalon maleo</i>	630
<i>Phylloptera segonoides</i>	649
Stomach of <i>Plotus levaillanti</i>	680
Head of <i>Gazella granti</i> (side view)	724
Head of <i>Gazella granti</i> (front view)	725
Trachea of <i>Rhynchæa capensis</i> , ♂ ♀	748
Podobranchia of the antepenultimate thoracic limb of <i>Astacus fluviatilis</i>	757
Podobranchiæ of the first maxillipede of <i>Astacus fluviatilis</i> , <i>Astacoides madagascariensis</i> , and <i>Parastacus brasiliensis</i>	759
Branchiostegite of <i>Astacus fluviatilis</i>	760
Branchiostegite of <i>Astacopsis franklinii</i>	760
Podobranchia of the antepenultimate thoracic limb of <i>Astacopsis franklinii</i>	765
Podobranchia of the antepenultimate thoracic limb of <i>Cheraps</i>	767
Podobranchia of the antepenultimate thoracic limb of <i>Astacoides madagascariensis</i>	772
Antler of <i>Cervulus muntjac</i>	898
Antler of <i>Cervus</i> (<i>Rusa</i>) <i>aristotelis</i>	900
Antler of <i>Cervus</i> (<i>Rusa</i>) <i>hippelaphus</i>	903
Antler of <i>Cervus</i> (<i>Rucervus</i>) <i>duvauceli</i>	905
Antler of <i>Cervus</i> (<i>Elaphurus</i>) <i> davidianus</i>	906
Antler of <i>Cervus</i> (<i>Axis</i>) <i>axis</i>	907
Antler of <i>Cervus</i> (<i>Pseudaxis</i>) <i>sika</i>	908
Antler of <i>Cervus</i> (<i>Cervus</i>) <i>elaphus</i>	910
Antler of <i>Cervus</i> (<i>Dama</i>) <i>dama</i>	914
Antler of <i>Cervus</i> (<i>Dama</i>) <i>mesopotamicus</i>	914
Antler of <i>Alces machlis</i>	915
Antler of <i>Capreolus capræa</i>	917
Antler of <i>Cariacus</i> (<i>Cariacus</i>) <i>virginianus</i>	918
Antler of <i>Cariacus</i> (<i>Cariacus</i>) <i>macrotis</i>	921
Antler of <i>Cariacus</i> (<i>Blastocerus</i>) <i>paludosus</i>	922

Antler of <i>Cariacus (Blastocerus) campestris</i>	Page 923
Antler of <i>Cariacus (Furcifer) antisiensis</i>	923
Antler of <i>Cariacus (Coassus) rufus</i>	924
Antler of <i>Rangifer tarandus</i>	927
Palate of <i>Indicator</i>	932
Palatal aspect of the truncated vomer of <i>Ramphastor ariel</i>	933
Syrinx of <i>Indicator major</i>	935
Section of chambered part of shell of <i>Vermetus gigas</i>	966
Section of chambered part of shell of <i>Spondylus varius</i>	967
Section of part of shell of <i>Nautilus striatus</i>	970
Section of part of shell of <i>Spirula australis</i>	971
Protoconch and protosiphon, with following chambers, of <i>Spirula australis</i>	973

ERRATA.

Page 666, line 7, for *rufo-niger* read *brunneo-niger*.

Page 667, line 2, for *rufo-niger* read *brunneo-niger*.

Page 670, line 18, *for* are not yet quite adult *read* are quite adult.

Page 723, line 2 from bottom, *for* p. 535 *read* p. 527.

Page 929, line 1, *for* Western *read* Eastern.

PROCEEDINGS

OF THE

SCIENTIFIC MEETINGS

OF THE

ZOOLOGICAL SOCIETY

OF LONDON

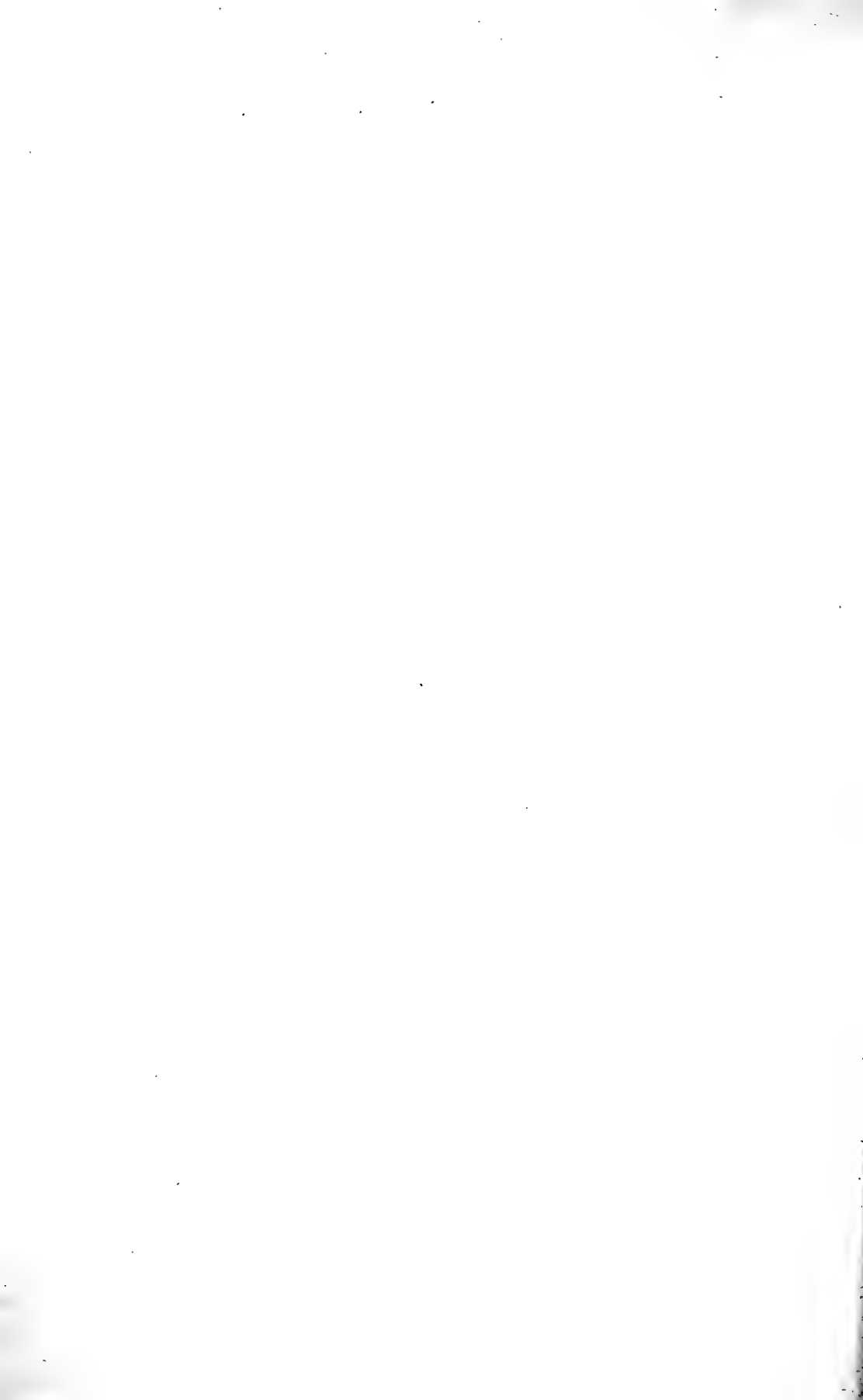
FOR THE YEAR

1878.

(P L A T E S.)

PRINTED FOR THE SOCIETY,
AND SOLD AT THEIR HOUSE IN HANOVER SQUARE.

LONDON:
MESSRS. LONGMANS, GREEN, READER, AND DYER,
PATERNOSTER ROW.



LIST OF PLATES.

1878.

Plate		Page
I.	Asiatic <i>Lithosiidæ</i>	3
II.		
III.		
IV.	<i>Zonotrichia vulcani</i>	37
V.	New Shells from Costa Rica	72
VI.	<i>Ceyx argentata</i>	106
VII.	Fig. 1. <i>Hypothymis cælestis</i> . Fig. 2. <i>Mixornis capitalis</i>	
VIII.	Fig. 1. <i>Dicæum schistaceum</i> . Fig. 2. <i>Dicæum everetti</i>	
	Fig. 3. <i>Prionochilus olivaceus</i>	
IX.	<i>Dasycrotapha speciosa</i>	114
X.	<i>Amadina sharpii</i>	128
XI.	<i>Myiarchus semirufus</i>	135
XII.	<i>Capito steerii</i>	
XIII.	<i>Crypturus transfasciatus</i>	
XIV.	<i>Lophosalea anamallayana</i>	153
XV.	New Opisthobranchiate Mollusca	275
XVI.	New Species of <i>Plusiotis</i>	293
XVII.	New Species of <i>Penæidæ</i>	298
XVIII.	New Shells from Kurrachi, Madagascar, Ecuador, and Australia	311
XIX.	<i>Prinia poliocephala</i>	370
XX.	<i>Otaria ursina</i> : 1, ♂; 2, ♀; 3, juv.	371
XXI.	<i>Casuarius edwardsi</i>	389
XXII.	Brachiopoda of the 'Lightning' and 'Porcupine' expeditions	393
XXIII.		
XXIV.	Anatomy of <i>Hyæna crocuta</i>	416
XXV.		
XXVI.	<i>Pitta kochi</i>	429
XXVII.	<i>Neomorphus radiolosus</i>	438
XXVIII.	<i>Aramides calopterus</i>	
XXIX.	<i>Amblynura kleinschmidtii</i>	440

Plate		Page
XXX.	Stridulating Organ of <i>Palinurus</i>	442
XXXI.	<i>Hemiptera</i> of St. Helena	444
XXXII.	<i>Fuligula nationi</i>	477
XXXIII.	<i>Ptilopus pictiventris</i>	500
XXXIV.	<i>Ptilopus gestroi</i>	
XXXV. } XXXVI. }	New Mantidæ	580
XXXVII.	<i>Tiga everetti</i>	611
XXXVIII.	<i>Trichostoma rufifrons</i>	
XXXIX.	<i>Tapirus roulini</i>	632
XL.	New Lepidoptera	637
XLI.	<i>Sciurus pusillus</i>	656
XLII.	<i>Carpophaga melanochoa</i>	670
XLIII.	Anatomy of <i>Chlamydophorus truncatus</i>	673
XLIV.	Anatomy of <i>Hyomoschus</i>	682
XLV.	New Asiatic <i>Hesperidæ</i>	686
XLVI.	New and other Shells from various localities	727
XLVII.	Trachea of <i>Rhynchæa bengalensis</i>	745
XLVIII.	New Shells	795
XLIX.	<i>Pæoptera lugubris</i>	802
L.	Shells of the Andaman Islands	804
LI. } LII. } LIII. }	Lepidoptera from Upper Tenasserim	821
LIV.	New Shells	859
LV.	Classification of the <i>Cervidæ</i>	883
LVI.	Skull of <i>Gazella walleri</i>	929
LVII.	<i>Accipiter stevensoni</i>	936
LVIII.	<i>Pseudoptynx gurneyi</i>	
LIX.	<i>Chætura picina</i>	955
LX.	Chambered shells of Cephalopods	
LXI.	<i>Ara spixi</i>	976
LXII.	<i>Zamenis elegantissimus</i>	977

LIST OF THE PUBLICATIONS

OF THE

ZOOLOGICAL SOCIETY OF LONDON.

THE scientific publications of the Zoological Society are of two kinds — “Proceedings,” published in an octavo form, and “Transactions,” in quarto.

According to the present arrangements, the “Proceedings” contain not only notices of all business transacted at the scientific meetings, but also all the papers read at such meetings and recommended to be published by the Committee of Publication. From fifty to seventy coloured plates and engravings are attached to each annual volume of the “Proceedings,” to illustrate the new or otherwise remarkable species of animals described in them. Amongst such illustrations, figures of the new or rare species acquired in a living state for the Society’s Gardens are often given.

The “Proceedings” for each year are issued in four parts, on the first of the months of June, August, October, and April, the part published in April completing the volume for the preceding year. They may be obtained with black or coloured illustrations.

The “Transactions” contain such of the more important communications made to the scientific meetings of the Society as, on account of the nature of the plates required to illustrate them, are better adapted for publication in the quarto form.

Fellows, and Honorary, Foreign, and Corresponding Members, upon payment of a Subscription of £1 1s. before the day of the Anniversary Meeting in each year, are entitled to receive all the Society’s Publications for the year. They are likewise entitled to purchase the Publications of the Society at 25 per cent. less than the price charged for them to the Public. A further reduction of 25 per cent. is made upon purchases of Publications issued prior to 1861, if they exceed the value of five pounds.

The following is a complete list of the publications of the Society already issued. They may be obtained at the Society’s Office (11 Hanover Square, W.), at Messrs. Longmans’, the Society’s publishers (Paternoster Row, E.C.), or through any bookseller:—

[April 1, 1879.]

PROCEEDINGS OF THE COMMITTEE OF SCIENCE AND CORRESPONDENCE OF THE ZOOLOGICAL SOCIETY OF LONDON.

8vo. 2 vols.

				To Fellows.	To the Public.
Part I.	1830-31.	1 vol. 8vo.....	Price	4s. 6d.	... 6s.
„ II.	1832.	„	„	4s. 6d.	... 6s.

PROCEEDINGS OF THE ZOOLOGICAL SOCIETY OF LONDON.

8vo. 15 vols. and Index. (First Series.)

		Price to Fellows.	Price to the Public.			Price to Fellows.	Price to the Public.
Part I.	1833. 1 vol. 8vo.	4s. 6d.	... 6s.	Part IX.	1841. 1 vol. 8vo.	4s. 6d.	... 6s.
„ II.	1834. „	4s. 6d.	... 6s.	„ X.	1842. „	4s. 6d.	... 6s.
„ III.	1835. „	4s. 6d.	... 6s.	„ XI.	1843. „	4s. 6d.	... 6s.
„ IV.	1836. „	4s. 6d.	... 6s.	„ XII.	1844. „	4s. 6d.	... 6s.
„ V.	1837. „	4s. 6d.	... 6s.	„ XIII.	1845. „	4s. 6d.	... 6s.
„ VI.	1838. „	4s. 6d.	... 6s.	„ XIV.	1846. „	4s. 6d.	... 6s.
„ VII.	1839. „	4s. 6d.	... 6s.	„ XV.	1847. „	4s. 6d.	... 6s.
„ VIII.	1840. „	4s. 6d.	... 6s.	Index	1830-47. „	4s. 6d.	... 6s.

PROCEEDINGS OF THE ZOOLOGICAL SOCIETY OF LONDON.

8vo. 13 vols. and Index. (Second Series.)

Without Illustrations.				With Illustrations.			
		To Fellows.	To the Public.			To Fellows.	To the Public.
Part		£ s. d.	£ s. d.	Price	£ s. d.	£ s. d.	£ s. d.
XVI.	1848. 1 vol. 8vo.	4s. 6d.	... 6s.	1	1 0	... 1 7 6	
„ XVII.	1849. „	4s. 6d.	... 6s.	„	1 1 0	... 1 7 6	
„ XVIII.	1850. „	4s. 6d.	... 6s.	„	1 7 6	... 1 18 0	
„ XIX.	1851. „	4s. 6d.	... 6s.	„	0 16 0	... 1 1 0	
„ XX.	1852. „	4s. 6d.	... 6s.	„	0 16 0	... 1 1 0	
„ XXI.	1853. „	4s. 6d.	... 6s.	„	0 18 0	... 1 4 0	
„ XXII.	1854. „	4s. 6d.	... 6s.	„	1 0 0	... 1 6 0	
„ XXIII.	1855. „	4s. 6d.	... 6s.	„	1 7 6	... 1 18 0	
„ XXIV.	1856. „	4s. 6d.	... 6s.	„	1 1 0	... 1 7 6	
„ XXV.	1857. „	4s. 6d.	... 6s.	„	1 1 0	... 1 7 6	
„ XXVI.	1858. „	4s. 6d.	... 6s.	„	1 12 0	... 2 2 0	
„ XXVII.	1859. „	4s. 6d.	... 6s.	„	1 12 0	... 2 2 0	
„ XXVIII.	1860. „	4s. 6d.	... 6s.	„	1 12 0	... 2 2 0	
Index	1848-60. „	4s. 6d.	... 6s.				

ILLUSTRATIONS TO THE PROCEEDINGS OF THE ZOOLOGICAL SOCIETY OF LONDON, 1848-60. 8vo. 6 vols.

					To Fellows.	To the Public.
					£ s. d.	£ s. d.
Mammalia	1 vol., containing	83 Plates	...	Price	2 8 0	... 3 3 0
Aves	2 vols., „	173 „	...	„	4 15 0	... 6 6 0
Reptilia et Pisces ...	1 vol., „	43 „	...	„	1 3 0	... 1 10 6
Mollusca	1 vol., „	51 „	...	„	1 3 0	... 1 10 0
Annulosa et Radiata	1 vol., „	90 „	...	„	2 3 0	... 3 3 0

PROCEEDINGS OF THE SCIENTIFIC MEETINGS OF THE ZOOLOGICAL SOCIETY OF LONDON.

	Complete.		Letterpress only.		Illustrations only.	
	To Fellows.	To the Public.	To Fellows.	To the Public.	To Fellows.	To the Public.
1861, cloth	32s.....	47s.....	4s. 6d.....	6s.....	27s. 6d.....	41s.
1862, „	32s.....	47s.....	4s. 6d.....	6s.....	27s. 6d.....	41s.
1863, „	32s.....	47s.....	4s. 6d.....	6s.....	27s. 6d.....	41s.
1864, „	32s.....	47s.....	4s. 6d.....	6s.....	27s. 6d.....	41s.
1865, „	32s.....	47s.....	4s. 6d.....	6s.....	27s. 6d.....	41s.
1866, „	32s.....	47s.....	4s. 6d.....	6s.....	27s. 6d.....	41s.

	With Illustrations Uncoloured.		With Illustrations Coloured.	
	To Fellows.	To the Public.	To Fellows.	To the Public.
1867, cloth.....	11s. 6d. ...	14s. 6d. ...	32s. 6d. ...	47s. 6d.
1868, „	11s. 6d. ...	14s. 6d. ...	32s. 6d. ...	47s. 6d.
1869, „	11s. 6d. ...	14s. 6d. ...	32s. 6d. ...	47s. 6d.
1870, „	11s. 6d. ...	14s. 6d. ...	32s. 6d. ...	47s. 6d.
Index, 1861-1870.....	4s. 6d. ...	6s. 0d.		
1871, cloth.....	11s. 6d. ...	14s. 6d. ...	32s. 6d. ...	47s. 6d.
1872, „	11s. 6d. ...	14s. 6d. ...	32s. 6d. ...	47s. 6d.
1873, „	11s. 6d. ...	14s. 6d. ...	32s. 6d. ...	47s. 6d.
1874, „	11s. 6d. ...	14s. 6d. ...	38s. 6d. ...	50s. 6d.
1875, „	11s. 6d. ...	14s. 6d. ...	38s. 6d. ...	50s. 6d.
1876, „	11s. 6d. ...	14s. 6d. ...	38s. 6d. ...	50s. 6d.
1877, „	11s. 6d. ...	14s. 6d. ...	38s. 6d. ...	50s. 6d.
1878, „	11s. 6d. ...	14s. 6d. ...	38s. 6d. ...	50s. 6d.
1878, part 4 (Nov. & Dec.)	2s. 3d. ...	3s. 0d. ...	9s. 0d. ...	12s. 0d.

TRANSACTIONS OF THE ZOOLOGICAL SOCIETY OF LONDON. 4to. 9 vols. and eleven Parts.

			To Fellows.			To the Public.		
			£	s.	d.	£	s.	d.
Vol. I., containing 59 Plates	(1833-35)	Price	3	13	6 ...	4	18	0
Vol. II., „ 71 „	(1835-41)	„	4	0	0 ...	5	6	6
Vol. III., „ 63 „	(1842-49)	„	3	8	6 ...	4	11	0
Vol. IV., „ 78 „	(1851-62)	„	6	2	0 ...	8	2	6
Vol. V., „ 67 „	(1862-66)	„	5	3	6 ...	6	19	0
Vol. VI., „ 91 „	(1866-69)	„	11	5	0 ...	15	0	0
Vol. VII., „ 73 „	(1869-72)	„	8	17	0 ...	11	16	0
Vol. VIII., „ 82 „	(1872-74)	„	9	8	3 ...	12	11	0
Vol. IX., „ 99 „	(1875-77)	„	12	0	0 ...	16	0	0
Vol. X., pt. 1, containing 43 woodcuts	(May 1877)	„	0	9	0 ...	0	12	0
Vol. X., part 2, containing 27 plates	(Aug. 1877)	„	1	2	6 ...	1	10	0
Vol. X., part 3, „ 6 „	(Oct. 1877)	„	0	18	0 ...	1	4	0
Vol. X., part 4, „ 9 „	(March 1878)	„	1	2	6 ...	1	10	0
Vol. X., part 5, „ 3 „	(March 1878)	„	0	9	0 ...	0	12	0
Vol. X., part 6, „ 9 „	(June 1878)	„	1	2	6 ..	1	10	0
Vol. X., part 7, „ 7 „	(Aug. 1878)	„	0	18	0 ...	1	4	0
Vol. X., part 8, „ 8 „	(Aug. 1878)	„	0	15	0 ...	1	0	0
Vol. X., part 9, „ 3 „	(Aug. 1878)	„	0	9	0 ...	0	12	0
Vol. X., part 10, „ 6 „	(Feb. 1879)	„	0	12	0 ...	0	16	0
Vol. X., part 11, „ 5 „	(Feb. 1879)	„	0	9	0 ...	0	12	0

Such of these publications as are in stock may be obtained at the Society's Office (11 Hanover Square, W.), at Messrs. Longmans', the Society's publishers (Paternoster Row, E.C.), or through any bookseller.

*Now ready, price £25, in two volumes, bound in half-morocco,
containing 100 coloured plates,*

ZOOLOGICAL SKETCHES

By **JOSEPH WOLF.**

MADE FOR

**THE ZOOLOGICAL SOCIETY OF LONDON,
FROM ANIMALS IN THEIR VIVARIUM.**

EDITED, WITH NOTES,

By **PHILIP LUTLEY SCLATER, M.A., Ph.D., F.R.S.,**
SECRETARY TO THE SOCIETY.

THIS series of Drawings was undertaken with the object of preserving a faithful record of the living characters of the most rare and interesting Animals in the Vivarium of the Zoological Society of London.

In selecting the subjects, particular regard has been paid to those species which exhibit aptitude for acclimatization, either as objects of economic value, or simply as additions to the Exotic Animals which are now so frequently seen in the parks and on the ornamental waters of Europe.

The Drawings have been executed in Water Colours, after most careful study, by Mr. WOLF, who may be fairly said to stand alone in minute knowledge of the habits and forms of Mammalia as well as of Birds; and the Lithographic copies, partly printed in colour and then finished by hand, are in such exact fac-simile as to be scarcely distinguishable from the originals.

The Letterpress, prepared by the Editor, embraces all particulars of interest relating to the general history, habits, distribution, and use of the Animals illustrated in the Plates.

London: GRAVES AND Co., Pall Mall.

Price 6d., Sewed,

A GUIDE TO THE GARDENS

OF THE

ZOOLOGICAL SOCIETY OF LONDON.

Thirty-second Edition, corrected according to the present Arrangement of the Gardens,

By **PHILIP LUTLEY SCLATER, M.A., Ph.D., F.R.S.,**
SECRETARY TO THE SOCIETY.

London: BRADBURY, AGNEW, AND Co., 10 Bouverie Street; and at the Society's Gardens in the Regent's Park.

PROCEEDINGS
OF THE
SCIENTIFIC MEETINGS
OF THE
ZOOLOGICAL SOCIETY OF LONDON.

January 15, 1878.

Robert Hudson, Esq., F.R.S., in the Chair.

The following report on the additions to the Society's Menagerie during the month of December 1877 was read by the Secretary:—

The total number of registered additions to the Society's Menagerie during the month of December 1877 was 103, of which 17 were by birth, 28 by presentation, 24 by purchase, 21 by exchange, and 13 were received on deposit. The total number of departures during the same period, by death and removals, was 101.

The most noticeable additions during the month were:—

1. A Family of Gelada Baboons (*Cynocephalus gelada*), deposited by Mr. C. Hagenbeck, December 7th, consisting of an adult male, three young males, and four females of this singular and little-known Monkey. A single example of it was once before exhibited for a short time in the Society's Menagerie; but this is the first occasion on which we have had an opportunity of watching their curious habits and observing their grass-eating propensities.

2. A pair of Musk-deer (*Moschus moschiferus*), presented by Sir Richard Pollock, K.C.S.I., H.M.Z.S., Commissioner at Peshawur, N.W. P., and arrived December 15th. This is believed to be the first pair of Musk-deer that have reached Europe alive. They have been placed temporarily in one of the outer cages of the New Lion-house, and seem likely to do well.

The Secretary read the following letter from Mr. A. Anderson, F.Z.S., containing a correction of his last paper on the Raptorial Birds of the N.W. Provinces:—"I find that Mr. Hume is right in his conjecture¹ that the bird figured at pl. xxiii. P. Z. S. for 1876, as *Falco babylonicus*, is an abnormally coloured *F. barbarus*.

"Mr. Gurney, who has kindly (at my request) reexamined the bird, and compared it with specimens at the British Museum, has authorized my publishing the following memorandum which he has drawn up on the subject.

"Memorandum.

"At the request of Mr. Anderson I inspected the Falcon, figured in the Society's 'Proceedings' for 1876, on pl. xxiii., as a specimen of *Falco babylonicus*, before that figure was drawn. The specimen struck me as smaller than any *F. babylonicus* I had previously seen, and as having rufous edgings to a larger proportion of the feathers of the mantle; but it certainly did not occur to me that it was any thing else than a small male of *F. babylonicus*, with the male of which species I was not, however, well acquainted, the specimens of that Falcon in the Norwich Museum being apparently, by their size, all females.

"At p. 140 of 'Stray Feathers' for 1877 this Falcon is referred to; and the Editor suggests that it is too small for *F. babylonicus*, and 'might perhaps be *F. barbarus*.'

"In consequence of this remark, I recently took the skin, at Mr. Anderson's request, to the British Museum for comparison, and found that it closely agrees with a Falcon from Nubia in that collection, both in size and in coloration; this Nubian Falcon has been identified by Mr. Sharpe with *F. barbarus*, and is specimen *a*. in the enumeration given at p. 387 of vol. i. of his British-Museum Catalogue.

"I believe that Mr. Sharpe's identification of this specimen is correct, and that both it and Mr. Anderson's Etawah Falcon are abnormally coloured specimens of *F. barbarus*.

"J. H. GURNEY.

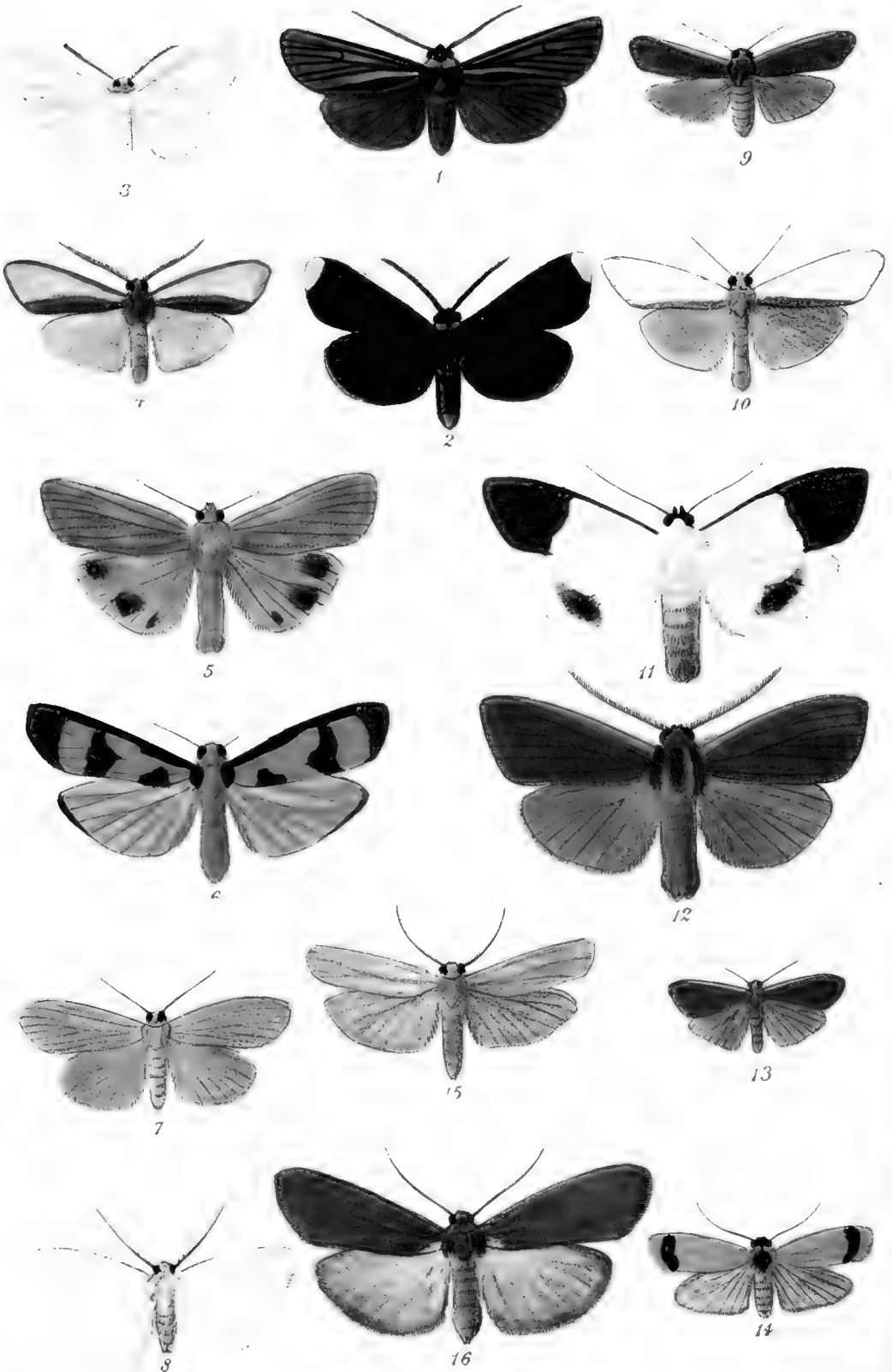
"6th December, 1877.

"In expressing my regret that the mistake in question should have occurred, I may remark that I believe the present is the first recorded occurrence of an adult *F. barbarus* within the limits to which I have restricted my researches, whereas the capture of *F. babylonicus* has been of comparative frequency; the addition therefore of the former (*F. barbarus*) to my plains Catalogue is of greater importance than if it had been the latter (*F. babylonicus*)."

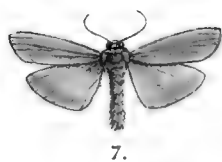
The following papers were read:—

¹ Cf. 'Str. Feath.' for 1877, p. 140.

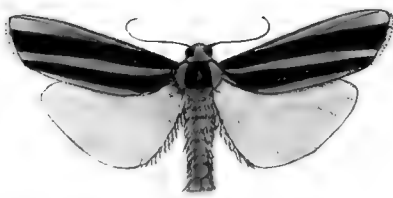








7.



1.



13.



8.



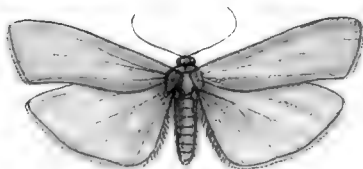
2.



14.



9.



3.



15.



10.



4.



16.



11.



5.



17.



12.



6.



18.





1.



13.



7.



2.



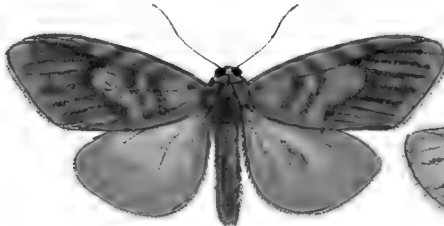
14.



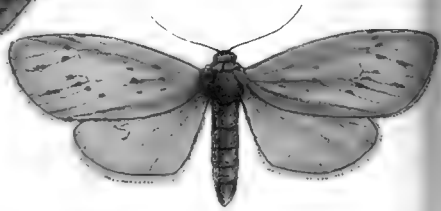
8.



3.



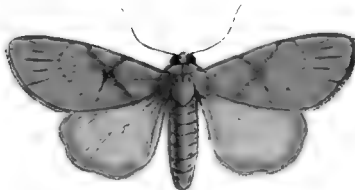
15.



9.



4.



16.



10.



5.



17.



11.



6.



18.



12.

1. A Revision of certain Genera of European and Asiatic Lithosiidæ, with characters of new Genera and Species.
By F. MOORE, F.Z.S., Assistant Curator, India Museum, London.

[Received October 29, 1877.]

(Plates I.-III.)

Family LITHOSIIDÆ.

Subfamily HYP SINÆ.

All the genera in this subfamily possess a peculiar stridulatory apparatus in both sexes. This is distinctly visible on the upperside of the posterior margin of the fore wing, and as viewed from the *underside* of the wing appears as a short oval nacreous cavity, situated between the submedian vein and the extreme margin, along the upper edge of which projects a raised longitudinally oblique fold, which is smooth in some, and transversely scabrous in others; and on the *upperside* of the hind wing is a patch of scabrous scales, or a short transverse outwardly-curved raised scabrous bar, which, by the motion of this wing, evidently plays upon the raised fold over the edge of the cavity, and produces a stridulating sound.

HYP SA, Hübner, Verz. bek. Schm. p. 172.

HYP SA CANARAICA, n. sp.

Female. Upperside—fore wing cinereous brown; veins white; base of wing ochreous and spotted with black; a whitish clavate streak from lower end of the cell; cilia cinereous: hind wing white, with broad black marginal band crossed by white veins; four black discal spots and a short anal streak; cilia whitish. Thorax ochreous, with small black spots; abdomen brighter ochreous, with a dorsal and lateral row of black spots. Underside cinereous brown, basal half of fore wing white, with two broad black spots within, and a third below the cell; hind wing as above, with the marginal band extending along the costa. Near to *H. heliconia*.

Expanse 2 inches.

Canara (*Ward*). In coll. F. Moore.

HYP SA SERICEA, n. sp.

Male. Upperside pale silky ochreous-yellow; cilia whitish: fore wing with the base brighter and dotted with black; an indistinct whitish spot from lower end of the cell: hind wing with costal border whitish; a broad cinereous brown marginal band and two confluent longitudinal discal streaks. Body pale ochreous-yellow; abdomen brighter with dorsal and lateral row of black spots; palpi with black terminal point and two lateral spots; legs grey, streaked with black. Underside cinereous brown; fore wing with yellow hind margin and basal costal streak; hind wing with marginal band and

discal streaks almost confluent, being separated only by a narrow yellow division.

Expanse $1\frac{7}{8}$ inch.

Canara (*Ward*). In coll. F. Moore.

Near to *H. heliconia*.

DAMALIS, Hübner.

Damalis, Hübner, Verz. bek. Sch. p. 172.

DAMALIS CONCANA, n. sp.

Near to *H. alciphron*, Cram. pl. 133. f. E.

Upperside ochreous; cilia white: fore wing at base bright ochreous and dotted with black; a small whitish streak from lower end of the cell: hind wing with black marginal band crossed by pale veins, and two irregular longitudinal discal streaks. Thorax with black dots; abdomen with dorsal and lateral row of black spots; legs whitish, streaked with black. Underside—fore wing pale ochreous-brown; hind margin yellow; cell white, bordered with black and enclosing a black spot: hind wing yellow, with paler black marginal band, and streaks as above.

Expanse $2\frac{2}{8}$ inches.

Canara (*Ward*). In coll. F. Moore.

DIGAMA, Moore.

Digama, Moore, Catal. Lep. E.I. C. ii. p. 298 (1858).

Fore wing—first branch of subcostal long, free; second at a considerable distance before end of the cell, trifurcate; fifth from near end of the cell, curved upward and looped to third at one third its length; radial from end of the cell; discocellulars nearly erect; median vein four-branched, upper from end of the cell, second and third from angles near its end. Hind wing with two subcostal branches beyond the cell; discocellulars curved outward, oblique; four median branches, three upper from end of the cell. Below the submedian vein on the underside of the fore wing, is a short longitudinal cavity, along the upper edge of which projects a raised transversely scabrous narrow bar; and on the upperside of the hind wing is a short transverse outwardly curved raised scabrous bar, so placed that, by the motions of this wing, it evidently plays across the longitudinal bar on the fore wing and produces a stridulatory sound.

DIGAMA HEARSEYANA.

D. hearseyana (part), Moore, Catal. Lep. E.I. C. ii. p. 298. pl. 7 A. f. 3 a, ♀ (1858).

Male and female. Upperside—fore wing greyish brown, with four basal transverse series of black spots, and an intermediate spot in the cell, with paler interspaces along the veins and wavy bands across the disk: hind wing and abdomen ochreous yellow, the latter with dorsal row of black spots. Thorax, head, and palpi grey-brown; front and middle of thorax black-spotted; joints of palpi with terminal black band; legs black-banded above, pale ochreous

beneath. Underside—fore wing uniform pale grey-brown; hind wing with a small black discocellular spot at upper end of cell.

Expanse, ♂ $1\frac{2}{10}$, ♀ $1\frac{3}{10}$ inch.

N.W. India (Allahabad, Manpuri, Deyra, Simla).

In the Catalogue Lep. East-India Company, above quoted, is described and figured (fig. 3) a male insect from Ceylon, which I then considered to pertain to this species. The Ceylon specimens, however, are very distinct; and the species has been named by Felder as *D. insulana*.

DIGAMA INSULANA.

Digama insulana, Feld. Verh. zool.-bot. Gesch. 1868, p. 285.

D. hearseyana (part), Moore, Catal. Lep. E.I. C. ii. p. 298, pl. 7. f. 3, ♀ (1858).

Male and female. Upperside—fore wing pale grey-brown, basal spots prominent: hind wing ochreous yellow, male with a grey-brown marginal streak, and female with a short marginal spot, situated near the middle. Head and thorax pale grey-brown, black-spotted; abdomen ochreous, with dorsal black spots; antennæ brown in male; legs black-banded above; palpi with terminal black bands. Underside paler; both wings with a black spot at end of the cell.

Expanse $1\frac{1}{8}$ inch.

Ceylon. In coll. India Museum.

DIGAMA SIMILIS, n. sp.

Male and female. Allied to *D. hearseyana*, but of smaller size; fore wing similarly marked; hind wing in the male with a dusky brown marginal streak from near anal angle, and another near apex, the latter only present in the female.

Expanse ♂ 1, ♀ $1\frac{1}{10}$ inch.

N.W. Himalaya (Simla). In coll. F. Moore.

DIGAMA FIGURATA, n. sp.

Male. Upperside—fore wing greyish white, with very prominent brown basal spots, two median, transverse, irregular, sinuous, partly confluent bands, and a partly confluent marginal band; a large black spot in middle and a lunule at end of the cell: hind wing pale ochreous yellow, with prominent black marginal marks. Thorax and head white, spotted with black; antennæ brown; palpi white, with broad terminal black bands; abdomen ochreous-yellow, with dorsal and lateral black spots; legs white, with black bands above. Underside—forewing grey-brown, spots in cell visible; hind wing with black spot at end of the cell, and on middle of outer margin.

Expanse $1\frac{3}{10}$ inch.

Burmah. In coll. F. Moore.

CALPENIA, Moore.

Calpenia, Moore, P. Z. S. 1872, p. 571.

CALPENIA KHASIANA, n. sp.

Female. Upperside—fore wing brownish fawn-colour vinous-tinged,

paler along the veins; a broad pale yellow band extending longitudinally from base below the cell and upward to near the costa, being crossed by the veins; some yellow spots on the costa; a small spot and streak at base of cell, and two outer submarginal rows of small dentate spots of chrome-yellow: hind wing chrome-yellow, with four transverse rows of vinous brownish black spots and a rayed basal streak, the spots broadly lunate, irregular in size, the outer row being marginal and the smallest. Antennæ, front of head, and palpi black; thorax dark greyish brown, longitudinally streaked with chrome-yellow; abdomen chrome-yellow, with dorsal and lateral row of spots. Underside same as above; legs dark grey.

Expanse $3\frac{1}{4}$ inches.

Khasia hills (*Atkinson*). Coll. Dr. Staudinger.

NEOCHERA, Hübner.

Neochera, Hübner, Verz. bek. Schmett. p. 173.

NEOCHERA HELICONIODES, n. sp.

Male. Upperside—fore wing purplish cinerous; all the veins narrowly lined with white; base of wing black-spotted, and with a subbasal orange-yellow streak with zigzag borders: hind wing grey-black, washed with purplish blue; three grey streaks from the base and a prominent submarginal grey narrow undulating band; cilia white. Body orange yellow; a black spot on each tegula, one on hind part of thorax, and a dorsal and lateral row of spots on abdomen. Underside grey-black; both wings with white external veins and undulating submarginal band; the basal area broadly white and with a large blackish cell-spot; front of head with a central black spot; palpi and legs white, streaked with black.

Expanse $2\frac{5}{8}$ inches.

Luzon, Philippines. In Coll. Dr. Staudinger.

Similar in pattern to *Hypsa heliconia*.

Subfamily LITHOSIINÆ.

The genera are here arranged in the following sectional groups, viz. :—

A. Fore wing with subcostal vein *five*-branched, median vein *four*-branched :

Eligma, *Macrobrochis*, *Tripura*, *Paraona*, *Atolmis*, *Sidyma*, *Churina*, *Vamuna*, *Mahavira*, *Korawa*, *Hesudra*, *Ghoria*, *Chrysægla*, *Eonistes*, *Lithosia*.

B. Fore wing with subcostal vein *five*-branched, median vein *three*-branched :

Simareea, *Tarika*, *Brunia*, *Gandhara*, *Collita*, *Katha*, *Eilema*, *Manulea*, *Systropha*, *Chrysorabdia*, *Capissa*, *Dolgoma*, *Mithuna*, *Cossa*, *Ranghana*, *Tegulata*.

B A. Hind wing with a recumbent plumose lappet :
Nishada.

B B. Fore wing with a recumbent plumose lappet :

Teulisna, *Macotasa*, *Zadadra*, *Prabhasa*, *Gampola*.

C. Fore wing with subcostal vein *four*-branched, median vein *three*-branched :—

Pelosia.

D. Fore wing with a plumose, lappet-covered, sac-like cavity on the costal border ; *five* subcostal and *three* median branches :

Doliche, *Bizone*, *Cyana*.

E. Aberrant group : fore wing with *five* subcostal and *four* median branches :

Baroa, *Agrisius*, *Lyclene*, *Barsine*, *Miltochrista*, *Setinochroa*, *Setina*, *Nudaria*, *Emene*.

GROUP A. Fore wing with subcostal vein *FIVE*-branched, median vein *FOUR*-branched.

ELIGMA, Hübner.

Eligma, Hübn. Verz. bek. Schmett. p. 164 (1816).

Panglima, Moore, Catal. Lep. E.I. C. ii. p. 297 (1858).

Surina, Walk. Tr. Nat.-Hist. Soc. Glasgow, i. p. 9 (1869).

Fore wing—first subcostal branch free ; second from near end of the cell, trifurcate ; fifth from end of the cell, bent up and with a short spur looped to third close to its base ; radial from end of the cell ; discocellulars bent, upper longest ; median vein four-branched, angled at end of the cell, two upper branches from the front and third from angle below the end, fourth from beyond half towards the base. Hind wing—two subcostal branches, and three upper median branches from end of the cell.

Type, *E. narcissus* (*P. narcissus*, Cram. Lep. Exot. i. pl. 73. f. E, F).

China, Java, Penang, S. India.

MACROBROCHIS, H.-S.

Macrobrochis, H.-Schæff. Lep. Exot. Sp. Nov. pl. 72. fig. 531 (1856).

Fore wing—first subcostal branch free, curving upwards at its base towards costal vein ; second from near end of the cell, trifurcate ; fifth from end of the cell, bent upward and with a short spur looped to third near its base ; radial starting from fifth subcostal branch beyond the cell ; upper and lower discocellulars bent inward at very oblique angles ; median vein bent upward near end of cell, four-branched, two upper from point at end of the cell, third from angle below its end. Hind wing—two subcostal and two upper median branches from beyond end of the cell, third median below its end.

Type, *M. gigas* (*Lithosia gigas*, Walk. Cat. Lep. Het. B. M. ii. p. 494, 1854 ; *M. interstitialis*, H.-S. l. c. f. 531).

MACROBROCHIS LEUCOSPILOTA, n. sp.

Male and female. Differs from *M. gigas* (*Lithosia gigas*, Walk. Catal. Lep. Het. B. M. ii. p. 494) in the fore wing having more elongated white spots, and in the hind wing having the marginal band much narrower and traversed by a series of elongated spots on both upper and underside.

Expanse $2\frac{3}{4}$ inches.

Cherra Punji, Assam. In coll. India Museum, and F. Moore.

MACROBROCHIS NIGRESCENS, n. sp.

Male. Allied to *M. gigas*. Differs in the spots on the fore wing being much less distinct; the basal and discal spots partly covered with black scales and totally obsolete on the underside; on the hind wing the base is only slightly dusky-white on both sides.

Expanse $2\frac{3}{4}$ inch.

N.E. Bengal. In coll. F. Moore.

TRIPURA, Moore.

Tripura, Moore, Catal. Lep. E.I. C. ii. p. 298 (1858).

Fore wing—first subcostal branch free; second from before end of the cell, trifurcate; fifth from end of the cell, bent upward and touching third near its base; radial from end of the cell; discocellulars bent in the middle; median vein four-branched, two upper from angles at end of the cell, third from angle before its end. Hind wing—two subcostal branches beyond cell, three upper median branches at its end.

Type, *T. prasena*, Moore, *l. c.* p. 299, pl. vii. A. fig. 6 (1858).

Himalayas.

PARAONA, n. g.

Fore wing long, narrow, costa slightly arched, apex acute, exterior margin oblique, posterior margin slightly convex towards the base; subcostal vein five-branched; first branch oblique, free; second arising before end of the cell; third starting from above base of second, trifurcate towards its end; radial from end of the cell, curved upward and joined to third subcostal branch, at one fourth its length beyond the cell; discocellulars slightly bent in the middle; median four-branched, two upper at end and third before end of the cell. Hind wing long, somewhat narrow, apex slightly produced, exterior margin and angle convex; two subcostal branches one third beyond the cell; median four-branched, two upper beyond and third from end of the cell. Body stout. Antennæ in the male serrate, the teeth finely pectinate, setose in the female. Palpi small, ascending, pilose beneath, apical joint very minute. Legs stout, short; femora slightly pilose beneath; tibiæ thickened, middle and hind tibiæ spurred.

PARAONA SPLENDENS. (Plate I. fig. 1.)

Crambomorpha splendens, Butler, Trans. Ent. Soc. Lond. 1877, p. 357.

Bombay (*Dr. Leith*). In coll. British Museum, and F. Moore.

ATOLMIS, Hübner.

Atolmis, Hübn. Verz. bek. Schmett. p. 164 (1816).

Gnophria, Steph. Brit. Lep. ii. p. 98 (1829).

Fore wing—first subcostal branch free; second from before end of the cell, trifurcate; fifth from end of the cell, bent upward and touching third at half its length; radial from end of the cell; discocellulars bent inward; median four-branched, two upper from end of the cell, third from angle below its end. Hind wing—two subcostal branches beyond the cell; three upper median branches from its end.

Type, *A. rubricollis* (*N. rubricollis*, Linn).

Europe.

SIDYMA, Walker.

Sidyma, Walk. Catal. Lep. Het. B. M. vii. p. 1686 (1856).

Fore wing—first subcostal branch long, free; second from near end of the cell, trifurcate; fifth from end of the cell and touching third near its base; radial from fifth subcostal branch at some distance beyond the cell; discocellulars bent; median vein angled near end, four-branched, two upper from end, third from angle below end of the cell: hind wing—two subcostal and three upper median branches from end of the cell.

Type, *S. albifinis*, Walk. Catal. Lep. Het. B. M. vii. p. 1686.

Masuri, N.W. Himalayas (*Capt. Lang*).

SIDYMA APICALIS, n. sp. (Plate I. fig. 2.)

Male. Upperside purplish-black; fore wing with a narrow triangular white apical patch. Collar, thorax beneath, and anal tuft orange-red. Underside as above.

Expanse $1\frac{3}{8}$ inch.

Darjiling (*Atkinson*). In coll. Dr. Staudinger.

Smaller than *S. albifinis*, which is known only from Masuri. Distinguished by having the apical white patch on the fore wing only.

CHURINGA, n. g.

Male and female. Wings ample, broad, somewhat short in male. Fore wing with the costa slightly arched towards end, apex pointed, exterior margin oblique, posterior angle rounded; first subcostal branch very oblique, free; second from near end of the cell, trifurcate; fifth from end of the cell, with a loop-spur to the base of the third; radial starting from below the fifth subcostal beyond end of the cell; discocellulars of equal length, bent inward at the middle; median vein four-branched, two upper from end of cell, next at some distance before and lower from half length of the cell. Hind wing convex at the apex; exterior margin rounded, abdominal margin short; two subcostal branches at one fourth beyond end of the cell; median four-branched, two upper from end, next before the end, and lower from half length of the cell. Body large; thorax with long pilose tegulæ. Antennæ in male broadly pectinate, setose in female. Palpi slender, ascending, basal joint pilose beneath, second and third

joints very long, tip blunt. Legs long, femora slightly pilose beneath.

Type, *C. rufifrons*. Will also include *Lithosia beema*, Moore, P. Z. S. 1865, p. 798.

CHURINGA RUFIFRONS, n. sp. (Plate I. fig. 12.)

Male and female. Upperside—fore wing pale purplish ochreous-brown, costal and posterior margins narrowly edged with ochreous yellow; hind wing and abdomen pale ochreous-yellow. Thorax brown; tegulæ edged with yellow; head, collar, and palpi reddish ochreous; thorax beneath and legs bright ochreous; tip of palpi, antennæ, fore legs above, and tarsi, brown. Underside paler.

Expanse, ♂ $1\frac{9}{10}$, ♀ $2\frac{3}{10}$ inches.

Darjiling (*Atkinson*). In coll. Dr. Staudinger and F. Moore.

VAMUNA, n. g.

Fore wing long, narrow; costa slightly arched beyond the middle; apex acute; exterior margin short and slightly truncate below the apex, oblique hindward, the angle slightly convex; posterior margin convex towards the base in male. Hind wing broad; apex slightly produced; exterior margin convex in the middle. Veins similar to those in *Churinga* (*C. rufifrons*), excepting that in the fore wing the lowest or fifth branch of the subcostal is emitted from upper angle of the cell, the median branches nearer together at their base, and the lowest nearer the end of the cell. Body moderately stout. Antennæ in both sexes setose. Palpi moderately long, ascending, projecting beyond the head, second joint long, third joint very short. Legs long, naked; middle and hind spurred.

Type, *V. remelana* (*Lithosia remelana*, Moore, P. Z. S. 1865, p. 798).

Darjiling.

VAMUNA MACULATA, n. sp. (Plate I. fig. 5.)

Male. Upperside—fore wing greyish ochreous; hind wing pale dull ochreous at base and whitish externally, with three marginal black spots, the two upper larger, the lower small and at some distance from anal angle. Body ochreous. Underside dull ochreous basally, whitish externally; fore wing with a brownish patch at the apex, a black longitudinal basal streak, and a broad large transverse subapical patch; hind wing with only the lower and middle marginal black spots. *Female* much paler, the apex of fore wing slightly brownish-ochreous; hind wing above and beneath with smaller median and lower black spots; the fore wing with the basal black streak less defined and the subapical spot small.

Expanse, ♂ $1\frac{5}{8}$, ♀ 2 inches.

Darjiling (*Atkinson*). In coll. Dr. Staudinger and F. Moore.

VAMUNA BIPARS, n. sp. (Plate I. fig. 11.)

Male. White, costal edge of the base and apical half of fore wing fuliginous black; hind wing with a fuliginous-black submarginal band,

the middle portion of which is very broad and blackest. Antennæ, front of head, and tip of palpi black; fore and middle legs above, a terminal spot on hind tibiæ and their tarsi, black; tarsal joints with a white band; base of palpi, thorax and abdomen, legs beneath, and anal tuft ochreous. Underside duller white; the black band on fore wing confined to the disk, the apical border being pale brownish-ochreous; upper portion of band on hind wing obsolete.

Expanse 2 inches.

Darjiling (*Atkinson*). In coll. Dr. Staudinger and F. Moore.

MAHAVIRA, n. g.

Male. Fore wing long, narrow, costa arched, apex acute, exterior margin oblique, posterior margin recurved; subcostal vein five-branched, first and second arising before and near end of the cell, third trifurcate, the two lower branches at equal distances from end of the cell; discocellulars long, straight, upper obliquely inward, lower obliquely outward; radial from upper end of the cell; median vein four-branched, the two upper branches from lower end of the cell, third at some distance before its end; submedian vein curving towards hind margin: hind wing longer than broad, exterior margin convex; subcostal vein two-branched beyond end of cell; discocellulars as in fore wing; median vein four-branched, the two upper branches from end of cell and contiguous at their base, third immediately before end of the cell. Body slender. Antennæ serrate, with long and delicate pectinations. Legs slender, femora slightly pilose beneath; middle and hind tibiæ spurred. Palpi slender, porrect, basal joint pilose, apex pointed.

MAHAVIRA FLAVICOLLIS, n. sp. (Plate I. fig. 3.)

Male. White, costa slightly edged with brown at the base; collar yellow; antennæ yellow; fore femora with a blackish streak on the inner side.

Expanse $1\frac{2}{8}$ inch.

Darjiling (*Atkinson*). In coll. Dr. Staudinger and F. Moore.

KORAWA, n. g.

Male and female. Fore wing long, narrow; costa slightly arched; apex somewhat acute, exterior margin very oblique; subcostal vein five-branched, first branch ascending and touching the costal but free at its end, second starting before end of the cell, third at end of the cell, trifurcate, lowest branch at one third beyond end of the cell; upper discocellular angled outward at its middle, lower oblique; radial from angle of upper discocellular; median vein four-branched, the two upper from lower end of the cell; submedian slightly recurved. Hind wing moderately short, apex slightly produced and convex, exterior margin rounded; subcostal two-branched beyond end of the cell; discocellulars of equal length, bent inward; median vein four-branched, two upper beyond end of the cell, middle branch from end of the cell; submedian nearly straight. Body moderate.

Palpi small, porrect, pilose. Antennæ minutely and finely bipectinate. Legs pilose, sparsely in male.

KORAWA PALLIDA, n. sp.

Male and female. Semidiaphanous; fore wing pale fleshy-yellow; hind wing white; thorax slightly ochreous-yellow; abdomen white; palpi black-tipped; legs white, fore tibiæ with a black longitudinal line in front.

Expanse ♂ $1\frac{1}{2}$, ♀ 2 inches.

Darjiling (*Atkinson*). In coll. Dr. Staudinger and F. Moore.

HESUDRA, n. g.

Male. Wings short, rather broad. Fore wing with the costa nearly straight; apex acute, exterior margin very oblique; subcostal vein five-branched, first branch very oblique, free, running close to costal, second arising before end of the cell, trifurcate, fifth from end of the cell, looped to third near its base; radial from upper end of cell; discocellulars bent in the middle; median vein four-branched, two upper from one fourth beyond the cell, third near its end. Hind wing produced at the apex; exterior margin very oblique, nearly straight; abdominal margin long; two subcostal branches from one fourth beyond the cell; median four-branched, two upper from one third beyond the cell, third close to its end. Antennæ broadly pectinate. Palpi slender, curved upward, slightly pilose at base. Legs slender.

HESUDRA DIVISA, n. sp. (Plate I. fig. 4.)

Male. Upperside pale testaceous: fore wing with a broad dark purplish-grey band occupying the posterior half of the wing; base of the costa also purplish grey; costal border yellowish. Thorax, head, side of palpi, and legs above, purplish grey; abdomen pale greyish, testaceous beneath, tip ochreous; base of palpi and legs beneath pale ochreous; antennæ purplish-brown. Underside—fore wing pale purplish-grey, costal border yellowish; hind wing narrowly edged along the anterior margin with greyish black.

Expanse $1\frac{3}{4}$ inch.

Darjiling (*Atkinson*). In coll. Dr. Staudinger and F. Moore.

GHORIA, n. g.

Fore wing long, narrow, costa slightly arched beyond the middle, apex acute, exterior margin oblique and slightly convex, posterior margin long; first subcostal branch very oblique, free; second trifurcate; fifth from end of the cell and bent upward, looped to the third near its base; radial starting from below the fifth subcostal branch at one third beyond the cell; discocellulars obliquely concave; median four-branched, the two upper from end of cell, third immediately before its end, fourth at half its length. Hind wing broad, apex slightly produced, exterior margin convex in the middle; two subcostal branches at one third beyond the cell; median four-branched, two upper beyond the cell, third at its end. Body slender, extending

beyond hind wing. Antennæ setose. Legs slender, squamose. Palpi slender, porrect, base pilose beneath.

GHORIA ALBOCINEREA, n. sp. (Plate I. fig. 10.)

Male. Upperside—fore wing silky white, with a cinereous-brown band along posterior margin: hind wing cinereous; cilia white. Thorax and abdomen white; middle of thorax and streak on tegulæ cinereous brown; collar and front of head, and antennæ yellowish; anal tuft pale brownish ochreous. Underside cinereous brown, palest on hind wing, abdominal margin cinereous white; costal edge of fore wing yellowish towards the apex. Legs cinereous brown above, yellowish beneath; palpi yellowish, tip brown.

Expanse $1\frac{4}{10}$ inch,

Darjiling (*Atkinson*). In coll. Dr. Staudinger and F. Moore.

GHORIA SERICEIPENNIS, n. sp.

Male. Upperside—fore wing silky white, with a broad dark cinereous brown band along posterior margin; hind wing white, pale cinereous brown at the apex and along anterior margin. Middle of thorax and tegulæ, and front of head, dark cinereous brown; abdomen above and beneath white, anal tuft brown; collar yellowish; palpi ochreous yellow; legs above cinereous brown, whitish beneath. Underside—fore wing, anterior border, and apex of hind wing brown.

Expanse $1\frac{2}{8}$ inch.

Darjiling (*Atkinson*). In coll. Dr. Staudinger.

CHRYSÆGLIA, Butler.

Chrysægla, Butler, Trans. Ent. Soc. 1877, p. 356.

Veins of the fore wing similar to those in *Æonistis entella*. Those in the hind wing differ in the median having but three branches, two only starting from the end of the cell.

Type, *C. magnifica* (*Lithosia magnifica*, Walk. Journ. Linn. Soc. vol. vi. p. 103), from Borneo.

CHRYSÆGLIA FERRIFASCIATA, n. sp. (Plate I. fig. 6.)

Male and female. Upperside golden yellow: fore wing glossy, with a steel-blue band along the costa, a broad transverse median band and a large triangular spot near base of posterior margin; also a blackish outer marginal band, which is broadest in the male; median band dilated hindward and angled on its inner margin below the cell: hind wing with the margin and cilia at the apex slightly blackish. Tegulæ and legs steel-blue. Underside paler yellow; fore wing with pale dusky brown bands as above.

Expanse, ♂ $1\frac{8}{10}$, ♀ $2\frac{2}{10}$ inches.

Nepal (*Ramsay*), Darjiling (*Grote*). In coll. F. Moore.

ÆONISTIS, Hübner.

Æonistis, Hübn. Verz. bek. Schmett. p. 165 (1816).

Fore wing—first subcostal branch long, free; second arising from near end of the cell; third from its end, trifurcate; radial curving

from end of the cell; discocellulars bent in the middle; median vein four-branched, two upper from end, third from angle before end of the cell. Hind wing—two subcostal branches immediately beyond end of the cell, two upper median branches from beyond, and third from end of the cell.

Type, *Æ. entella* (*P. entella*, Cram. Pap. Exot. pl. 208. f. D).

India, Ceylon,

Will also include *Gnophria ceramensis*, Voll. Tijdsch. voor Ent. 1872, iii. p. 246, pl. 12. f. 1.

LITHOSIA, Fabr.

Lithosia, Fabr. Ent. Syst. Suppl. p. 459 (1798).

Sexes dissimilar in colour and pattern. Fore wing with first subcostal branch free, second starting near end of the cell, trifurcate, fifth curving up from end of the cell and touching third near its base; radial from end of the cell in male, from angle of upper discocellulars in female; discocellulars curved in male, angled at both ends in female; median four-branched, three upper from end of the cell. Hind wing with one subcostal branch in male, two in female beyond the cell; two median branches beyond the cell in male, and from its end in female.

Type, *Lithosia quadra* of Europe.

Will also include *Lithosia dives* (*Æonistis dives*, Butler, Ann. Nat. Hist. Nov. 1877, p. 398, from Japan).

GROUP B. *Fore wing with subcostal vein FIVE-branched; median vein THREE-branched.*

SIMAREEA, n. g.

Similar in form, colour, and pattern to the male of the European *L. quadra*, but of different venation in the fore wing; and both sexes are alike, the discocellulars not being bent at the upper and lower end of the cell (as in female *L. quadra*); and the median vein has only two branches in both sexes proceeding from end of the cell (*L. quadra* having three in the male). In the hind wing the costal vein has two branches beyond the cell in both sexes, *L. quadra* having one only; the median branches also start at some distance from the cell in both sexes. The palpi are more pilose, have the second and third joints much longer, the apex blunt, and projecting much beyond the head.

SIMAREEA BASINOTA. (Plate I. fig. 16.)

Lithosia basinota, Moore, P. Z. S. 1865, p. 798.

Darjiling.

TARIKA, n. g.

Fore wing long, broad; costa arched; exterior margin convex, posterior margin rounded at the base; first subcostal branch short, oblique, anastomosing with the costal, second from near end of the cell, third from near base of second, bifurcate, fifth from end of the cell, bent upward and touching the third at one fourth its length; discocellulars bent inward, upper angled close to subcostal, lower

shortest; radial from angle of upper discocellular; median three-branched, two upper branches at one third beyond the cell; submedian nearly straight. Hind wing broad, apex slightly produced; subcostal branches at one fourth and median branches at one third from end of the cell. Palpi small, short, slightly decumbent. Legs stoutish, naked. Antennæ minutely pectinate. Body slender, not extending beyond hind wing.

TARIKA VARANA. (Plate I. fig. 8.)

Lithosia varana, Moore, P. Z. S. 1865, p. 797.

Darjiling.

TARIKA NIVEA, n. sp.

Lithosia nivea, Walker, MS.

Male and female. Fore wing silky white, costal edge pale yellow; head, front of thorax, palpi, body and legs beneath, yellow; tip of palpi brown; fore and middle legs brown above.

Expanse, ♂ $1\frac{3}{8}$, ♀ $1\frac{5}{8}$ inch.

Darjiling (*Atkinson*). In coll. Dr. Staudinger and F. Moore.

BRUNIA, n. g.

Fore wing long, narrow; first branch of subcostal vein short, oblique, anastomosed to the costal, second starting from angle close before end of the cell, trifurcate, fifth from end of the cell and looped to third branch at its base; discocellulars bent below the middle, upper angled close to end of the cell; radial from angle of upper discocellular; two upper median branches at half length beyond end of the cell. Hind wing long, apex produced; two branches of subcostal vein at one third beyond the cell, and two median branches at two thirds beyond. Palpi ascending, pilose beneath.

BRUNIA ANTICA. (Plate I. fig. 9.)

Lithosia antica, Walker, Catal. Lep. Het. B. M. ii. p. 505.

Ceylon.

Will also embrace *Lithosia natara*, Moore, from Java, and *L. sarawaca*, Butler, from Borneo.

GANDHARA, n. g.

Fore wing broad, somewhat short; costa much arched beyond the middle; apex acute; exterior margin slightly oblique, rounded in middle; hind margin slightly rounded at the base; first branch of subcostal vein curving upward and extending free to beyond end of the costal, second and third branches starting together from end of the cell, third trifurcate; discocellulars zigzag, the angles equidistant; radial from upper angle; two upper median branches from lower angle of cell. Hind wing broad, short.

GANDHARA SERVA. (Plate I. fig. 7.)

Lithosia serva, Walker, Catal. Lep. Het. B. M. ii. p. 506.

Darjiling.

COLLITA, n. g.

Wings very broad. Fore wing with the costa arched; subcostal five-branched, first short, oblique, anastomosed to costal, second starting at some distance before end of the cell, third trifurcate, the fifth or lowest branch nearest the base; upper discocellular slightly angled close to subcostal, whence starts the radial; median three-branched, two upper at one fourth beyond the cell. Hind wing very broad, apex produced, exterior margin rounded in the middle, abdominal margin long and extending beyond abdomen; two subcostal branches and two upper medians from one third beyond the cell. Palpi short, porrect.

Type, *C. griseola* (*Lithosia griseola*) of Europe. Will also include *L. vetusta*, Walk., from China, and the European *L. complanula* and *L. stramineola*, Dbleday.

COLLITA LILACINA, n. sp.

Fore wing pale lilac-grey, with pale yellowish costal border; hind wing pale greyish ochreous; thorax grey; head pale yellow; palpi black-tipped; fore legs brownish above.

Expanse $1\frac{1}{2}$ inch.

W. Yunan (*Anderson*). In coll. F. Moore.

Similar in appearance to *Gandhara serva* (*Lithosia serva*, Walk.), from Sikkim, but of entirely different venation.

COLLITA PARVA, n. sp. (Plate I. fig. 13.)

Female. Fore wing greyish ochreous-brown; hind wing and abdomen paler; fore wing yellowish along the costal border. Underside uniform ochreous brown, palest on lower part of the hind wing. Legs cinereous brown above.

Expanse $\frac{8}{10}$ inch.

Darjiling (*Atkinson*). In coll. Dr. Staudinger.

Allied to *C. vetusta* (*Lithosia vetusta*, Walk.), from North China, having the same venation, but is of a much smaller size.

KATHA, n. g.

Wings clothed with stout compact imbricated scales.

Male. Fore wing long, very narrow; costa nearly straight, apex rounded; exterior margin slightly oblique; posterior margin recurved, convex near the base; slightly folded longitudinally below the median vein; cell long, narrow; discocellulars bent outward at upper end and inward at lower end; first branch of subcostal vein at some distance before end of the cell, short, oblique, and anastomosed to costal; second short, arising beyond end of the cell; third trifurcate, its lowest branch at equal distance between second and fourth; radial starting from upper angle of discocellular; two upper branches of median vein at half distance from end of the cell; submedian recurved. Hind wing long, broad; two subcostal branches at one third from cell; discocellulars slightly bent inward; two median branches at one half distance from the cell, and wide apart. Palpi

rather short, pilose at base, porrect. Antennæ minutely pectinate. Legs long, rather stout. Body long, extending beyond hind wing.

KATHA NIGRIFRONS. (Plate I. fig. 15.)

Lithosia nigrifrons, Moore, P. Z. S. 1872, p. 572.

North India.

This genus will also include *Lithosia apicalis*, Walk., from Borneo, *L. intermixta*, Walk., *L. brevipennis*, Walk., from South India, and *L. helveola* of Europe.

KATHA TERMINALIS, n. sp. (Plate I. fig. 14.)

Male. Ochreous; fore wing darkest, with a distinct curved purplish band across exterior margin. Antennæ, front of head, tip of palpi, middle of thorax, and streak on tegulæ purplish black; legs above purplish brown.

Expanse $1\frac{1}{2}$ inch.

Darjiling (*Atkinson*). In coll. Dr. Staudinger.

Allied to *K. apicalis* (*Lithosia apicalis*, Walk. Journ. Linn. Soc. Zool. vi. p. 104) from Borneo, but differs on the fore wing in the apical band not extending upward onto the costa, and in the absence of the slight apical patch on the hind wing, which is present in Bornean examples.

KATHA CUCULLATA, n. sp.

Male. Upperside—fore wing pale purplish grey, costal edge at apex and cilia yellowish; an indistinct greyish-brown outer marginal band; hind wing and abdomen pale ochreous grey; anal tuft ochreous. Thorax, top and front of head, and palpi except at base beneath, black; legs black, middle and hind legs pale beneath; antennæ black. Underside—fore wing brownish ochreous; hind wing pale ochreous.

Expanse $1\frac{1}{10}$ inch.

Andamans. In coll. F. Moore.

Allied to *K. terminalis* and *K. apicalis*.

EILEMA, Hübner.

Eilema, Hübn. Verz. bek. Schmett. p. 165 (1816).

Wings long, narrow. Fore wing with the subcostal five-branched, first short, oblique, and anastomosed to costal, second free and widely separated from third, third trifurcate, the lowest or fifth nearest the base, the two upper near apex; radial from upper end of the cell; discocellulars inwardly oblique; median three-branched, two upper beyond half distance from the cell, lower long, from near its base. Hind wing—two subcostal branches at one third, and two upper median branches at two thirds beyond the cell.

Type, *E. caniola*, Hübner, of Europe.

MANULEA, Wallengren.

Manulea, Wallengren, Ent. Monats. vii. p. 145.

Wings narrow. Fore wing with the costa not arched; subcostal vein

five-branched, first very oblique and free, running close to costal near its end, second arising at some distance before end of the cell, third starting and curving downward from second at half its length, bifurcate, fifth from end of cell and touching the third near its base; radial in a line with subcostal from end of the cell; discocellulars bent in the middle; median three-branched, two upper from one fourth beyond the cell. Hind wing narrow; abdominal margin short; two subcostal branches close to end of the cell; two upper median branches at nearly half length beyond.

Type, *M. gilveola* (*Lithosia gilveola*) of Europe.

MANULEA CALAMARIA, n. sp.

Male. Pale glossy straw-yellow; costal edge of fore wing at base dusky. Head, thorax, body beneath, and anal tuft brighter yellow; palpi black-tipped; legs above, and tarsi entirely, black; antennæ yellow. Underside darker; fore wing pale brownish luteous.

Expanse $1\frac{1}{2}$ inch.

N.W. Himalaya. In coll. F. Moore.

This species is allied to the European *M. gilveola*.

SYSTROPHA, Hübn.

Systropha, Hübn. Verz. bek. Schmett. p. 166 (1816).

Wings small. Fore wing short, narrow; subcostal five-branched, first branch short, oblique, anastomosing partly with costal near its end, second at some distance before end of the cell, third trifurcate, lowest branch at some distance beyond the cell; upper discocellular shortest, lower oblique and bent inward near end; radial from angle of upper; two upper median branches at half distance beyond the cell. Hind wing broad.

Type, *S. aureola* (*Lithosia aureola*) of Europe.

SYSTROPHA DORSALIS, n. sp.

Female. Fore wing straw-yellow, slightly ochreous along posterior margin; hind wing yellowish white. Head, thorax, legs, and abdomen at sides and beneath ochreous yellow; abdomen above lilac-grey.

Expanse $1\frac{2}{12}$ inch.

Darjiling (*Atkinson*). In coll. Dr. Staudinger.

SYSTROPHA AURIFLUA, n. sp. (Plate II. fig. 7.)

Fore wing glossy straw-yellow; hind wing paler yellow. Thorax, head, legs, and anal tuft brighter yellow.

Expanse $1\frac{1}{2}$ inch.

Manpuri, N.W. India (*Horne*). In coll. F. Moore.

CHRYSORABDIA, Butler.

Chrysorabdia, Butl. Trans. Ent. Soc. 1877, p. 357.

Fore wing—first subcostal branch contiguous to costal, second from before end of the cell and bent onto the third above its end, third trifurcate, curved upwards; radial from end of the cell; discocellulars

bent in the middle; median vein three-branched, two upper from end of the cell. Hind wing—two subcostal branches; discocellulars very slender, scarcely visible, two upper median branches.

CHRYSORABDIA VIRIDATA. (Plate II. fig. 1, ♂.)

Lithosia viridata, Walk. Catal. Lep. B. M. Suppl. p. 225.

Darjiling.

CAPISSA, n. g.

Fore wing long, narrow; costa arched before the apex, exterior margin oblique and convex, hind margin slightly convex near the base. Male with a longitudinal fold below the cell¹, where the scales are raised and rough; cell short, narrow; discocellulars of equal length, bent inward; first subcostal branch very short, oblique, anastomosed to costal; second immediately before end of the cell; third at its end, and trifurcate; radial from beyond end of the cell, starting from the third branch of subcostal near its base; median vein straight, three-branched, two upper from beyond end of the cell; submedian slightly recurved. Hind wing long, broad, apex produced, the male having the scales on the disk raised and rough; two subcostal and two median branches beyond end of the cell; discocellulars bent inward, upper the longest. Body long, slender, extending beyond hind wing. Antennæ minutely pectinate in male, setose in female. Palpi prominent, pilose at base, apex slender. Legs long, slender.

CAPISSA INNOTATA. (Plate II. fig. 2, ♂.)

Lithosia innotata, Butler, Trans. Ent. Soc. 1877, p. 352.

N.W. Himalayas.

This genus will also include *L. vagesa*, Moore, from the Khasia hills, *L. insolita*, Walk., from China, *L. nigripars*, Walk., from N. India, and *L. sambara*, Moore, from Java.

CAPISSA AURIFLAVA, n. sp.

Female. Fore wing deep golden-yellow; hind wing and abdomen paler. Underside of fore wing greyish at the base; femur, tibia, and tarsal joints with a black terminal band; palpi black at tip; antennæ yellow.

Expanse $1\frac{8}{12}$ inch.

Katmandu, Nepal (*General Ramsay*). In coll. F. Moore.

Allied to *C. vagesa* (*Lithosia vagesa*, Moore, Catal. Lep. E.I. C. ii. p. 304), but is of a deeper colour, and the legs are banded only with black, whereas in *C. vagesa* the legs are entirely black.

CAPISSA PALLENS, n. sp. (Plate II. fig. 3.)

Female. Pale whitish ochreous; fore wing glossy, costal edge ochreous. Thorax, palpi, and abdomen beneath ochreous; legs dusky brown above; palpi brown at tip; antennæ brown. Underside—costal border of both wings brighter-coloured; middle of fore wing pale ochreous brown.

¹ Probably a sound-producing apparatus.

Expanse $1\frac{5}{8}$ inch.

Darjiling (*Atkinson*). In coll. Dr. Staudinger.

Somewhat allied to *C. insolita* (*Lithosia insolita*, Walker, Catal. Lep. Het. B. M. ii. p. 497).

CAPISSA FLAVENS, n. sp.

Female. Glossy straw-yellow; hind wing and abdomen above slightly paler; apex of palpi, fore legs above, a terminal spot on middle and hind femora, and tarsi dusky brown.

Expanse $1\frac{1}{8}$ inch.

Saidabad, Cashmere (*Hellard*). In coll. F. Moore.

CAPISSA FASCIATA, n. sp. (Plate II. fig. 4, ♂.)

Male. Upperside ochreous yellow; fore wing with a brown-speckled fascia along the posterior border and about the disk; hind wing and base of abdomen pale yellow; antennæ, apical joint of palpi, and legs above brown.

Expanse $1\frac{4}{12}$ inch.

Ceylon. In coll. F. M. Mackwood.

DOLGOMA, n. g.

Male and female. Wings moderately long and broad. Fore wing with the subcostal vein bent at its second branch, five-branched, first branch curving upward but free from costal, second starting before end of the cell, curved upward, third trifurcate, lowest branch at one third its length beyond the cell; upper discocellular erect, lower oblique and bent inward; radial starting from the middle; two upper median branches at less than one fourth from end of the cell, lower branch angled and with a slight spur near its base. Hind wing—subcostal branches at one third and median branches at half distance beyond the cell.

Type, *D. reticulata* (*Lithosia reticulata*, Moore, P. Z. S. 1865, p. 798).

Darjiling.

DOLGOMA ANGULIFERA.

Lithosia angulifera, Feld. Nov.-Reise Lep. pl. 106. f. 12 (1868).

Male and female. Luteous; fore wing sparsely brown-speckled, crossed by a brown-speckled discal band, which is bent outward beyond end of the cell; hind wing pale luteous white. Underside paler-coloured.

Expanse, ♂ $1\frac{1}{2}$, ♀ $1\frac{1}{2}$ inch.

Darjiling. In coll. F. Moore.

DOLGOMA BRUNNEA, n. sp. (Plate II. fig. 8.)

Male. Cinereous brown; fore wing uniformly dark-coloured; hind wing paler. Underside paler than above; costal border of fore wing, and legs beneath, yellowish.

Expanse 1 inch.

Darjiling (*Atkinson*). In coll. Dr. Staudinger and F. Moore.

MITHUNA, n. g.

Wings short, rather broad. Fore wing arched, apex pointed; first branch of subcostal vein arising near end of the cell, short, oblique, anastomosing with costal but free at its end; second branch quadrifid, the upper and lower branches starting together at one third beyond the cell; upper discocellular very short, lower curved inward; radial from lower end of upper discocellular; two upper median branches starting at half distance beyond the cell, lower branch straight from one third before its end. Hind wing with subcostal and median branches at nearly one half length beyond the cell. Body short. Palpi small, pilose beneath. Antennæ setulose. Legs smooth.

MITHUNA QUADRIPLAGA, n. sp. (Plate II. fig. 9.)

Fore wing luteous brown, with a distinct dusky-brown median transverse band, which is angled outward at end of the cell, a similar band also crossing the disk; outer margin with a series of dusky spots, which also indistinctly cross the cilia: hind wing pale luteous brown. Underside paler. Head and thorax brown.

Expanse 1 inch.

Darjiling (*Atkinson*). In coll. Dr. Staudinger and F. Moore.

COSSA, Walker.

Cossa, Walk. Catal. Lep. Het. B. M. pt. xxxii. p. 232 (1864).

Male and female. Wings somewhat broad. Fore wing arched along the costa; first subcostal branch short, very oblique, anastomosed to costal, second free, third from end of the cell, trifurcate; discocellulars very oblique, angled at ends; radial from upper angle; two upper median branches from one third beyond the cell.

Type, *C. basigera*, Walk. *l. c.*

S. India.

COSSA QUADRISIGNATA, n. sp. (Plate II. fig. 10.)

Male. Fore wing dark purplish brown, with slightly paler streaks along the veins; costal border pale purplish cinereous, with two prominent short black streaks; a small spot at end of the cell: hind wing and abdomen above pale brownish cinereous; anal tuft slightly ochreous; thorax, head, abdomen beneath, and legs brown. Underside pale cinereous brown; middle of fore wing brown.

Expanse $1\frac{1}{8}$ inch.

Darjiling (*Atkinson*). In coll. Dr. Staudinger.

COSSA PALLIDA, n. sp.

Male. Pale greyish ochreous: fore wing with two prominent short black broad streaks on the costa, the first subbasal, the other slightly beyond the middle; a short, narrow, black streak at end of the cell: hind wing with a very indistinct dusky submarginal fascia. Abdomen greyish, tuft ochreous. Underside pale yellowish ochreous; middle of fore wing ochreous brown. Legs greyish brown above.

Expanse $1\frac{1}{2}$ inch.

Dharmasala (N.W. Himalaya). In coll. F. Moore.

COSSA BRUNNEA, n. sp. (Plate II. fig. 11.)

Female. Fore wing dark purple-brown, with a small black spot at end of the cell, and a short black streak on the costa near the middle: hind wing paler. Thorax, head, and legs dark brown. Underside with the margins paler.

Expanse $1\frac{1}{8}$ inch.

Darjiling (*Atkinson*). In coll. Dr. Staudinger.

RANGHANA, n. g.

Female. Fore wing very long, narrow; costa arched, apex pointed, exterior margin very oblique, angle and posterior margin rounded; subcostal vein five-branched, first branch short, arising immediately above end of the cell, and joining the costal, second and third at equal distance from first, third trifurcate; radial from below subcostal beyond the cell at equal distance between first and second branches; cell short; discocellulars straight; median vein straight, three-branched, two upper at one third from the exterior margin, lower recurving from below end of the cell; submedian veins extending to posterior angle. Hind wing long, narrow; subcostal branches at half length beyond the cell; cell short; discocellulars deeply curved; median straight, two-branched. Body short. Palpi very short, stout. Legs long, slender; middle and hind tibiæ spurred. Antennæ setose.

RANGHANA PUNCTATA, n. sp. (Plate II. fig. 12.)

Female. Pale ochreous-buff colour; fore wing with a marginal and apical series of nine small black spots. Underside paler, without marks.

Expanse $1\frac{1}{8}$ inch.

Calcutta (*Atkinson*). In coll. Dr. Staudinger.

TEGULATA, Walker.

Tegulata, Walk. Journ. Proc. Linn. Soc. 1862, p. 110.

Female. Fore wing with a convex protuberance on middle of the costa; apex pointed; first subcostal branch short, anastomosed to costal, second from angle before end of the cell, third trifurcate, lowest or fifth branch nearest base; discocellulars angled at each end; radial from upper angle below end of the cell; median vein three-branched, two upper one-third beyond the cell.

Type, *T. tumida*, Walk. l. c., from Borneo.

TEGULATA BASISTRIGA, n. sp. (Plate II. fig. 5.)

Female. Upperside pale luteous brown: fore wing brightest at the apex, slightly brown-speckled; a black streak along base of costal edge and along base of posterior margin: hind wing pale brownish fawn-colour externally. Underside darker. Legs brown above.

Expanse 1 inch.

Ceylon. In coll. Dr. Staudinger.

Allied to *T. tumida*, Walk.

TEGULATA PROTUBERANS, n. sp. (Plate II. fig. 6.)

Female. Upperside pale luteous brown; fore wing with numerous brown speckles and a dark brown prominent costal spot; hind wing and abdomen pale luteous-yellow. Underside paler; middle of fore wing brownish.

Expanse $1\frac{2}{12}$ inch.

Darjiling (*Atkinson*). In coll. Dr. Staudinger.

GROUP B. A. *Hind wing with a recumbent plumose lappet.*

NISHADA, n. g.

Male and female. Fore wing somewhat short, broad, costa considerably arched, apex very acute; exterior margin oblique and slightly convex; posterior margin short, in the male convex and fringed to near the base; subcostal vein five-branched, first branch arising at half length of the cell and slightly touching the costal vein, second at one third before end of the cell, third at some distance beyond the cell, fourth bifid at half its length; cell narrow; discocellulars very slender, upper short, lower obliquely curved inward; radial starting from lower end of upper discocellular; median vein three-branched, the two upper at nearly half distance beyond end of cell, lower before its end; submedian vein recurved upwards from the base. Hind wing in the male very short and broad, somewhat quadrate, anterior margin produced upward from the base and folded over onto the underside, and there provided with a long recumbent fan-like plumose covering or appendage¹; the hind wing in the female is longer, being of the same length as posterior margin of fore wing, its anterior margin nearly straight, and is without the folded plumose appendage; costal vein following the anterior margin beneath the fold in the male; subcostal vein two-branched, the upper arising near base of the wing; cell broad; discocellulars recurved; median vein straight, two-branched, the branches very close together, lower branch from before end of the cell; submedian straight. Antennæ minutely and finely pectinate in male, setose in female. Body slender, extending beyond hind wing. Legs stout, smooth; fore femora thickened; middle and hind tibiæ spurred. Palpi small, porrect, projected slightly beyond the head, pilose beneath, apex small, pointed.

NISHADA FLABRIFERA, n. sp.

Male and female. Yellowish ochreous, palest in female; fore wing in male brighter ochreous, and slightly ferruginous at the base; thorax, head, and antennæ brownish ochreous.

Expanse 1 inch.

Calcutta District (*Farr*). In coll. F. Moore.

Allied to the Bornean *Lithosia rotundipennis*, Walk. Journ. Linn. Soc. Zool. vi. p. 104, which species is also probably identical with *L. chilomorpha*, Snellen Van Voll., Tijds. voor Ent. 1877, p. 67, pl. 5. fig. 1, from Sumatra. Both of these species will come into the genus *Nishada*.

¹ Probably a sound-producing apparatus.

GROUP B. B. *Fore wing with a recumbent plumose lappet.*

TEULISNA, Walk.

Teulisna, Walk. Journ. Proc. Linn. Soc. 1862, p. 109.

Male. Wings somewhat short and broad. Fore wing—costa depressed at the base, arched in the middle; apex pointed, exterior margin oblique, angle acute; posterior margin very convex towards the base; first subcostal branch short, anastomosed to costal; second free; third from end of cell, trifurcate; radial from third submedian branch at a considerable distance beyond the cell; cell folded over at base and overlapped for half its length by a recumbent plumose appendage¹; discocellulars very oblique; median three-branched, two upper at some distance beyond the cell.

Female without the fold and plumose tuft.

Type, *T. plagiata*, Walk. Journ. Linn. Soc. 1862, p. 109, from Borneo.

TEULISNA TENUISIGNA, n. sp. (Plate II. fig. 13.)

Male. Yellow. Differs from the same sex of *T. tetragona* in its smaller size, being also narrower in both wings. Fore wing with a lengthened black band beneath the cell, the upper end of which is straight, and the basal end very oblique and truncated; a small spot on costa before the apex; cilia slightly blackish at the apex. Middle of thorax, tegulæ, and front of head black; fore legs dusky above.

Expanse $1\frac{3}{10}$ inch.

Sikkim. In coll. F. Moore.

MACOTASA, n. g.

Male. Fore wing narrow; costa slightly raised beyond the middle; costal vein raised, with a recumbent plumose tuft overlapping basal half of the folded cell beneath¹; subcostal five-branched, first short, oblique, anastomosed to costal, second starting at some distance before end of the cell, third starting from second near its base and bent downward and touching end of the cell, bifurcate near its end, fifth starting in a straight line from end of the cell; discocellulars straight, nearly erect; radial starting in a straight line from lower end of the cell; median three-branched, the two upper at some distance apart below the radial and parallel to it, the base starting from below end of the cell in a line with the discocellulars; lower median branch from near base of cell, deeply curved. Hind wing somewhat narrow, apex pointed; two subcostal branches at one third beyond the cell; two upper median branches near its end. Antennæ minutely setulose. Palpi small, ascending. Legs slender.

Female. Fore wing not folded or plumed; radial starting from upper end of the cell; two upper median branches straight from beyond end of the cell.

¹ Probably a sound-producing apparatus.

MACOTASA BIPLAGELLA. (Plate II. fig. 14.)*Æcophora biplagella*, Walk. MS.

Upperside pale whitish luteous: fore wing with a dark brown median costal streak, which is indistinctly continued as a narrow band across the wing, the streak more prominent and larger in the male; apex also brown-streaked: hind wing whitish at the base.

Expanse, ♂ $1\frac{1}{2}$, ♀ $1\frac{2}{3}$ inch.

Borneo. In coll. British Museum and F. Moore.

ZADADRA, n. g.

Male. Fore wing shortened, distorted, and crumpled at the apex; costa arched beyond the middle, apex very convex, exterior margin very oblique hindward, posterior margin shortened and very convex; cell very long, folded and overlapped above with a short tuft of recumbent plumes its entire length¹; subcostal and median veins contiguous, the branches being near apex of the wing; discocellulars very convex; subcostal at some distance from costal, first branch recurved upward from end of the cell, second starting from near base of the first, bifurcate near the end, fourth before end of the cell and touching the second near its base, fifth branch and radial from end of cell; median vein three-branched, two upper beyond end of the cell, lower recurving from end near and parallel to upper branch; submedian boldly recurved. Hind wing long, broad; apex much produced; exterior margin recurved; cell long; upper discocellular long, inwardly oblique, lower very short and outwardly oblique; subcostal bifid from end of cell; median three-branched, two upper beyond end of cell, lower at half its length; submedian nearly straight. Body slender, longer than hind wing. Antennæ minutely and finely bipectinate. Legs long, smooth, spurred. Palpi slender, porrect; base pilose; apex long.

Female. Wings longer; cell of fore wing not folded or tufted, and the apex not crumpled; hind margin much less convex, and the submedian less recurved.

ZADADRA DISTORTA. (Plate II. fig. 15.)

Lithosia distorta, Moore, P. Z. S. 1872, p. 572.

Darjiling. In coll. F. Moore.

PRABHASA, n. g.

Wings long. Fore wing narrow, very slightly arched before the apex; exterior margin oblique, slightly convex; posterior margin long, nearly straight; subcostal vein at some distance from costal, first branch short, curving upward to costa before end of the cell, second straight from end of the cell, third contiguous at base to the second, trifurcate, looped to second near base; cell long, in the *male* folded and tufted with recumbent plumes above to beyond half its length¹; discocellulars long, convex; radial from lower part; median vein three-branched, two upper curving hindward from lower end of the cell, lower curving from below the cell at nearly half its length;

¹ Probably a sound-producing apparatus.

submedian recurved. Hind wing produced at the apex; exterior margin recurved; abdominal margin short; subcostal two-branched beyond the cell; discocellulars concave; cell short, broad; median vein three-branched, two upper branches at half distance beyond the cell, lower from before half its length; submedian nearly straight. Body slender, longer than hind wing, tufted in male. Antennæ slender, with very fine delicate pectinations. Legs slender, long, smooth, spurred. Palpi slender, long, slightly ascending beyond front of head.

PRABHASA VENOSA, n. sp. (Plate II. fig. 16, ♂.)

Male and female. Upperside pale luteous brown: fore wing with the veins darker brown; an indistinct brown transverse discal band, which is bent outward beyond the cell; male with a greyish-brown plumose tuft overlapping and extending half the length of the cell; anal tuft in male ochreous. Underside paler; band across fore wing not visible.

Expanse, ♂ $1\frac{1}{10}$, ♀ $1\frac{3}{10}$ inch.

Darjiling (*Atkinson*). In coll. Dr. Staudinger and F. Moore.

PRABHASA FLAVICOSTA, n. sp. (Plate II. fig. 17.)

Female. Upperside uniformly dark luteous brown: hind wing and abdomen purplish brown: fore wing with the costal border pale yellow; discal band most prominent at costal end, broad, but not bent outward. Front of head, thorax at sides, palpi and abdomen beneath, yellow; legs above cinereous brown, yellowish beneath. Underside uniform brown; costal border on both wings yellowish.

Expanse $1\frac{3}{10}$ inch.

Cherra Punji (*Atkinson*). In coll. Dr. Staudinger and F. Moore.

PRABHASA COSTALIS, n. sp.

Male and female. Whitish testaceous: fore wing with the costal border whitish, and a brown spot one third before the apex; lower part of wing brown-speckled, most distinct along the veins. Underside—fore wing testaceous brown, dark-speckled along the base of costa and subcostal vein. Legs dusky brown above.

Expanse, ♂ 1, ♀ $1\frac{2}{12}$ inch.

North China. In coll. F. Moore.

GAMPOLA, n. g.

Male. Wings short, broad, truncate at the apex. Fore wing arched towards the end, apical angle acute, exterior margin nearly erect, posterior angle convex and fringed; costal edge at the base folded over and fringed for a short distance¹; cell long and narrow, folded beneath the median vein; subcostal at some distance from costal, five-branched, first short, anastomosing with costal, but free at its end, second arising at some distance before end of the cell, third trifurcate, the upper branch nearest to and at one third beyond the cell; discocellulars bent below the middle, outwardly oblique, upper longest; radial from the angle; median vein bent upward near end of cell,

¹ Probably a sound-producing apparatus.

top branch from upper angle, second from lower, third from before half length of the cell. Hind wing quadrangular; two subcostal and two upper median branches from one third beyond the cell, lower median from half its length. Antennæ finely pectinated. Palpi small, porrect. Legs slender, naked, middle and hind spurred. Body slender, short.

Female. Wings longer, not truncate at apex; fore wing not folded; veins as in male, excepting that the hind wing has, apparently, only one upper median branch.

GAMPOLA FASCIATA, n. sp. (Plate II. fig. 18.)

Male. Upperside—fore wing pale brownish ochreous, brown-speckled, the speckles composed of dark stout scales forming a fascia below the cell and across the disk. Head, thorax, and abdomen fuliginous brown; anal tuft slightly ochreous; palpi brown at tip; legs slightly brown above. Hind wing and underside paler.

Female. Fore wing not brown-speckled, with an indistinct transverse dusky maculated discal band and a small spot at posterior angle. Underside dusky at apex of fore wing.

Expanse, ♂ $1\frac{1}{2}$, ♀ $1\frac{1}{2}$ inch.

Ceylon. In coll. F. M. Mackwood and Dr. Staudinger.

GROUP C. *Fore wing with subcostal vein FOUR-branched, median vein THREE-branched.*

PELOSIA, Hübn.

Pelosia, Hübn. Verz. bek. Schmett. p. 165 (1816).

Samera, Wallengren, Wien. ent. Mon. vii. p. 146.

Male and female. Wings rather short and broad. Fore wing with subcostal and costal veins wide apart; subcostal four-branched; first branch short, oblique, anastomosing with costal but free beyond its end; second arising at some distance before end of the cell, straight, widely separated between first and third; third bifid, at half distance from end of the cell; discocellulars bent inward, lower shortest, upper angled close to subcostal; radial from the angle of upper; two upper median branches from half distance beyond the cell, lower from half before its end. Hind wing—two branches of subcostal at one fourth, and median branches at two thirds beyond the cell.

Type, *P. muscerda* (*Lithosia muscerda*) of Europe.

GROUP D. *Fore wing with a plumose lappet-covered sac-like cavity*¹.

BIZONE, Walker.

Bizone, Walker, Catal. Lep. B. M. ii. p. 548.

BIZONE BELLISSIMA, n. sp. (Plate III. fig. 13.)

Male. Upperside—fore wing with a transverse basal and two oblique median red bands, a broad outer marginal ochreous-yellow band, and three black spots at end of the cell: hind wing and abdo-

¹ Probably a sound-producing apparatus.

men red; tuft white. Thorax white, with two red bands. Underside uniform red; cell-spots in fore wing and discocellular streak in hind wing blackish. Fore and middle legs with blackish bands. Body beneath and legs white. Palpi black at the side.

Expanse $1\frac{9}{12}$ inch.

Masuri, N.W. Himalaya (*Hutton*). In coll. F. Moore.

BIZONE COCCINEA, n. sp. (Plate III. fig. 14.)

Male. Upperside crimson-red, the base of fore wing slightly yellow; fore wing with a subbasal and discal black band, the former bent inward and the latter outward at the costal end; three black spots at end of the cell. Thorax yellowish, banded with red; anal tuft and abdomen beneath yellow; legs yellow, with red bands. Underside of wings uniform red.

Expanse $1\frac{3}{12}$ inch.

Sikkim. In coll. F. Moore.

BIZONE ALBA, n. sp.

Male. Upperside white: fore wing with a small basal red spot and narrow streak on base of costal edge; a black spot at end of the cell. Underside pale red, broadly on anterior margin of fore wing and narrowly on hind wing; palpi at sides and fore and middle legs with blackish bands.

Expanse $\frac{9}{12}$ inch.

North China. In coll. F. Moore.

GROUP E. *Aberrant*. Fore wing with FIVE subcostal and FOUR median branches.

BAROA, n. g.

Fore wing long, moderately broad; costa slightly arched; apex somewhat pointed; exterior margin oblique and convex; cell short, narrow; subcostal vein five-branched, first branch free, second trifurcate, the forks ascending, fourth from end of the cell; discocellulars angled at the ends; radial from upper angle; submedian four-branched, two upper from end and third from angle before end of the cell. Hind wing somewhat short, broad; apex pointed; exterior margin convex; two subcostal branches from end of the cell; three submedian branches from end and fourth before end of the cell. Body extending beyond hind wing. Palpi slender, long, pilose beneath, ascending and extending beyond the head; terminal joint blunt. Legs slender. Antennæ minutely pectinate in male, setulose in female.

Type, *Baroa punctivaga* (*Cynia punctivaga*, Walk. Catal. Lep. Het. B. M. iii. p. 682).

Java (*Horsfield*).

BARSINE, Walker.

Barsine, Walk. Catal. Lep. Het. B. M. ii. p. 456.

BARSINE FLAMMEALIS, n. sp. (Plate III. fig. 15.)

Fore wing yellow, mostly covered with bright-red intervening

streaks between the veins, crossed by three outwardly recurved grey-brown bands; some spots of same colour at base of the wing, and longitudinal discal streaks joining the outer band between the veins: hind wing pale pinky red. Body red; thorax with grey-brown spots. Underside—fore wing mostly red, slightly yellow on outer veins, and brighter yellow on outer margin; legs red.

Expanse 2 inches.

India. In coll. F. Moore.

Nearest allied to *B. mactans*, Butler.

BARSINE GLORIOSA, n. sp. (Plate III. fig. 16.)

Female. Upperside—fore wing ochreous red, veins broadly lined with yellow; a broad blackish well-defined subbasal cross band, a narrow discal recurved band, and an apical series of short black longitudinal streaks; two small black dots at base of wing; costal edge and cilia black: hind wing and abdomen pale pink. Thorax red, with a narrow black middle streak and two anterior spots; palpi and legs red. Underside—fore wing red, with short black costal and apical streaks; hind wing paler, apex dusky black; middle tibiæ with a black terminal streak.

Expanse $1\frac{4}{10}$ inch.

Khasia hills (*Atkinson*). In coll. Dr. Staudinger.

Nearest allied to *B. cruciata*, Walker, from Borneo.

BARSINE PUNICEA, n. sp.

Female. Upperside—fore wing ochreous yellow, slightly reddish along the costal border; with a blackish subbasal cross band, a waved curved discal band, and an outer series of alternated long and short longitudinal streaks; cilia and apical edge of costa black: hind wing pale ochreous red, with black marginal band. Abdomen blackish, tip yellow. Underside dull ochreous red; apex of fore wing and outer margin of hind wing blackish; middle tibiæ with a terminal black streak.

Expanse $\frac{7}{8}$ inch.

Darjiling (*Atkinson*). In coll. Dr. Staudinger and F. Moore.

This species is nearest allied to *B. lineata*, Walk. Cat. Lep. Het. B. M. iii. p. 760, from Borneo.

BARSINE INFLEXA, n. sp. (Plate III. fig. 17.)

Male. Upperside—fore wing ochreous red, veins lined with yellow; costal edge, posterior margin, and cilia black; a black subbasal cross band somewhat thickened within the cell, the outer lower arm of which is bent inward; a narrow discal transverse maculated band, and an outer series of short streaks, one on each vein: hind wing and abdomen pale pink. Thorax and head red, streaked with yellow; legs red. Underside—fore wing red, with black apex and margins; hind wing yellowish, with dusky black apex.

Expanse $\frac{7}{8}$ inch.

Darjiling (*Atkinson*). In coll. Dr. Staudinger and F. Moore.

BARSINE FLAVIVENOSA, n. sp. (Plate III. fig. 18.)

Male. Upperside—fore wing red, with all the veins very broadly lined with yellow; a blackish subbasal imperfect cross band, with the lower portion of the outer arm obsolete; a curved discal band and an incurved apical series of short black streaks: hind wing, abdomen, and legs very pale pink. Underside pink, hind wing palest.

Expanse $\frac{6}{8}$ inch.

Darjiling (*Atkinson*). In coll. Dr. Staudinger.

LYCLENÉ, Moore.

Lyclene, Moore, Catal. Lep. E. I. C. ii. p. 300.

Cyllene, Walk. Catal. Het. B. M. ii. p. 544.

LYCLENÉ RUBRICOSA, n. sp. (Plate III. fig. 1.)

Male and female. Ochreous red: fore wing with dusky-black subbasal broad zigzag band, an oblique median band and zigzag outer discal band, the latter slightly confluent about its middle in the female; a small spot also at base of wing, a curved spot at end of cell, and a small series along exterior margin. Thorax black-spotted. Underside with markings on fore wing indistinct; fore and middle tibiæ with a blackish streak.

Expanse $\frac{8}{10}$ inch.

Bombay (*Dr. Leith*). In coll. F. Moore.

Allied to *L. artocarpæ*.

LYCLENÉ ARTOCARPI, n. sp.

Male and female. Fore wing ochreous, with a dusky-grey subbasal series of short longitudinal streaks; an upright median band and outward discal oblique irregular band, both confluent on middle of the hind margin; a small blackish spot at base of wing, and an indistinct spot at end of the cell: hind wing and abdomen pale ochreous. Thorax with black spots. Underside paler, markings on fore wing less distinct; an indistinct median dusky fascia across hind wing in the female.

Expanse $\frac{6}{8}$ inch.

Darjiling (*Atkinson*). In coll. Dr. Staudinger and F. Moore.

Nearest allied to *L. humilis*, Walk. Catal. Lep. Het. B. M. ii. p. 554. "Larva feeds on the Jack tree (*Artocarpus incisa*), January."—*A. Grote*, MS. note.

LYCLENÉ RADIANS, n. sp. (Plate III. fig. 2.)

Male. Fore wing yellowish white, with a black basal spot, three transverse series of spots, each composed of three, and the middle series curved; a prominent spot at end of the cell, and a marginal series of broad black lines, one on each vein, their inner ends confluent and forming a bordered line, which is bent outward at its middle: hind wing with a less prominent series of short black marginal lines, which do not extend to the anal angle. Body ochreous yellow. Underside similarly marked, the basal spots on fore wing

less distinct; hind wing with two indistinct spots from middle of the costa; legs black-streaked.

Expanse 1 inch.

Darjiling (*Atkinson*). In coll. Dr. Staudinger.

LYCLENEL DELICATA, n. sp.

Female. Pale yellow: fore wing with some small black subbasal spots, a median transverse narrow line, a lunule at end of the cell, a discal recurved series of small spots, one on each vein, and an outer marginal series of very narrow black streaks, one on each vein: hind wing with a marginal series of very narrow black streaks, one on each vein. Underside with the outer marginal series of streaks and median line as above, the median line extending partly across hind wing; femora, tibiæ, and tarsi with black terminal streak.

Expanse $1\frac{1}{8}$ inch.

Darjiling (*Grote*). In coll. F. Moore.

Allied to *L. radians*. Differs in having all the markings much narrower, in addition to the median transverse line on the fore wing. From *L. prominens* it also differs in the more slender markings, and in the absence of the sharp dentate discal line.

LYCLENEL PROMINENS, n. sp. (Plate III. fig. 3.)

Male and female. Upperside ochrey yellow: fore wing with four black basal spots, a bent transverse subbasal line, a wavy median line, a narrow oblique spot at end of the cell, an irregular discal band with two sharply dentate points beyond the cell, and an outer marginal series of longitudinal streaks, one on each vein: hind wing with a marginal series of short black longitudinal streaks. Two black spots on middle of thorax. Underside marked as above, the median and discal lines broader, the former extending across hind wing; abdomen with black bands beneath; legs with black bands.

Expanse, ♂ 1, ♀ $1\frac{3}{4}$ inch.

Cherra; Khasia hills (*G.-Austen*). In coll. F. Moore.

LYCLENEL ZEBRINA, n. sp. (Plate III. fig. 4.)

Male. Upperside yellowish white: fore wing with brown basal linear spots, a median transverse line, a small spot at end of the cell, and a wide outer marginal series of narrow streaks: hind wing with a brown marginal band. Underside with broader markings than above, the middle line crossing the hind wing; marginal streaks in place of the band.

Expanse $\frac{8}{10}$ inch.

Calcutta District (*Farr*). In coll. F. Moore.

LYCLENEL PALMATA, n. sp. (Plate III. fig. 5.)

Female. Upperside pale ochrey yellow: fore wing with two bluish basal spots, a transverse linear series of three spots, a median maculated purple line, and a broad fan-shaped discal series of longitudinal purple streaks decreasing in length to middle of hind margin: hind wing with some short purple apical streaks. Underside marked as

above, the basal spots less distinct; tibiæ with black terminal band.

Expanse $1\frac{2}{10}$ inch.

N.E. Bengal. In coll. F. Moore.

LYCLENES INTERSERTA, n. sp. (Plate III. fig. 6.)

Female. Upperside—fore wing ochrey yellow, with a short black streak at the base, narrow subbasal transverse bent line, a discal line which is convex anteriorly and bent posteriorly; between these is an oblique-angled line, the point being opposite to the angle of the subbasal line; an upper and lower longitudinal line, the former along the cell, the latter below it and furcate, the forks bent backward; also an outer marginal confluent looped line; cilia black, with white border: hind wing pale yellow; cilia at apex black. Thorax and head yellow, with black streaks; palpi and legs above blackish; abdomen paler yellow. Underside uniform yellow, markings indistinct.

Expanse $1\frac{3}{10}$ inch.

Darjiling (*Atkinson*). In coll. Dr. Staudinger and F. Moore.

Near to *L. euprepioides*, Walk.

LYCLENES OBSOLETA, n. sp. (Plate III. fig. 7.)

Female. Yellow: fore wing slightly ochreous yellow externally; with several purplish-brown subbasal spots, a deeply sinuous discal band, and outer contiguous series of spots: hind wing and abdomen yellow. Underside paler; markings on fore wing indistinct; hind wing with a short costal streak before the apex; fore tibiæ with a blackish terminal streak.

Expanse $\frac{8}{10}$ inch.

Darjiling (*Atkinson*). In coll. Dr. Staudinger.

May be distinguished by the absence of the median transverse band between the subbasal spots and sinuous band.

LYCLENES DISCISTRIGA, n. sp.

Male and female. Fore wing yellow, with black basal speckled spots, a median transverse recurved narrow band, an oblique spot at end of the cell, a discal series of narrow longitudinal streaks, and a marginal series of small spots: thorax black-spotted: hind wing paler. Underside pale yellow; markings on fore wing very indistinct.

Expanse, ♂ $1\frac{1}{2}$, ♀ $1\frac{3}{2}$ inch.

Darjiling. In coll. F. Moore.

Allied to the Bornean *L. strigipennis*, H. S. Lep. Spec. Nov. f. 437.

LYCLENES INCONSPICUA.

Male. Pale ochreous red, semidiaphanous: fore wing with oblique transverse basal and median indistinct dusky band, and discal streaks, one along each vein and terminating in a marginal spot: hind wing

with a slight dusky apical streak. Underside—fore wing with the discal markings confluent. Legs with dusky streaks.

Expanse $1\frac{0}{2}$ inch.

Northern India (*Farr*). In coll. F. Moore.

LYCLENÆ TERMINATA.

Male. Upperside pale yellow; fore wing with black irregular basal streaks, an oblique recurved narrow median transverse line, an oblique streak at end of the cell, and a discal series of narrow elongated streaks, one on each vein and terminating in a spot at the outer margin. Underside of fore wing as above. Legs black-streaked.

Expanse $1\frac{0}{2}$ inch.

Khasia hills (*G.-Austen*). In coll. F. Moore.

LYCLENÆ ASSAMICA. (Plate III. fig. 8.)

Male. Pale yellow. Upperside—fore wing with a purple-brown basal spot, two subbasal transverse series of spots, a spot at end of the cell, and a discal dentate band, each point having a terminal spot which forms a submarginal series. Thorax black-spotted.

Expanse $1\frac{8}{2}$ inch.

Dibrughur, Assam (*Atkinson*). In coll. Dr. Staudinger.

Allied to both *L. undulosa* and the Bornean *L. cuneigera*, Walk.

LYCLENÆ SPILOSOMOIDES, n. sp.

Male. Upperside yellowish white; fore wing with two black spots at the base and one on the costa, a subbasal and discal recurved series of smaller linear spots, one on each vein. Body yellowish, tuft brighter; a black spot on each tegula; palpi and band on lower part of vertex brown. Underside uniformly paler, without markings.

Expanse $1\frac{7}{2}$ inch.

N.W. India. In coll. F. Moore.

LYCLENÆ INDISTINCTA, n. sp. (Plate III. fig. 9.)

Female. Fore wing dull yellow, with two very indistinct subbasal curved series of pale brown spots, a bent discal series of spots, and an outer series of short longitudinal streaks: hind wing and underside much paler; fore tibiæ cinereous-brown above.

Expanse $1\frac{11}{2}$ inch.

Darjiling (*Atkinson*). In coll. Dr. Staudinger.

ÆMENE, Walker.

Æmene, Walker, Catal. Lep. B. M. ii. p. 542.

ÆMENE MACULIFASCIA, n. sp. (Plate III. fig. 10.)

Male. Fore wing white, crossed by six black maculated bands; the first basal; second curved; third and fourth discal, irregular, and with dusky-brown suffused interspace; the other two marginal; two spots within the cell, the one at the end largest; cilia spotted near apex: hind wing ochreous-white. Thorax black-spotted;

palpi black; fore legs black-streaked. Underside—fore wing brown, spots slightly visible; hind wing with a brown spot at end of the cell, an indistinct submarginal fascia and spots on cilia near apex.

Expanse $1\frac{1}{2}$ inch.

Darjiling (*Atkinson*). In coll. Dr. Staudinger.

ÆMENE SINUATA, n. sp. (Plate III. fig. 11.)

Male. Upperside ochreous white: fore wing with five narrow black sinuous bands, a spot within and a lunule at end of the cell, and an outer marginal row of small spots; cilia with a black line and three widely separated spots: hind wing pale brownish-grey; cilia brown-lined; a black terminal spot on tegulæ. Underside brownish grey, markings on fore wing indistinct; hind wing with pale brown spot at end of the cell, and a submarginal fascia; palpi black; fore legs black-streaked.

Expanse 1 inch.

Cherra Punji (*Atkinson*). In coll. Dr. Staudinger.

ÆMENE SUBCINEREA, n. sp.

Allied to *Æ. taprobanis*; the fore wing greyish-ochreous, with markings more like those in *Æ. guttulosana*, but smaller and narrower; hind wing and abdomen cinereous. Underside cinereous-brown.

Expanse $\frac{7}{8}$ inch.

N.W. India. In coll. F. Moore.

ÆMENE MODESTA, n. sp.

Male. Nearest to *Æ. guttulosana*, Walk., from Bombay, but smaller in size, darker in colour, and the hind wing pale fuliginous; the markings on the fore wing much smaller, the spot at end of the cell narrow and lunular, and the sagittate mark below it nearly obsolete.

Expanse $\frac{8}{12}$ inch.

Formosa (*Swinhoe*). In coll. F. Moore.

ÆMENE TENEBROSA, n. sp.

Male and female. Fore wing hoary black, the grey scales prominent, with some black spots on the costa within and below the cell, and on the exterior margin; hind wing and abdomen cinereous-grey. Thorax hairy, black. Underside dark cinereous-grey; apex of fore wing ochreous; legs blackish above.

Expanse, ♂ $\frac{8}{12}$, ♀ $\frac{9}{12}$ inch.

Bombay. In coll. F. Moore.

Allied to *Æ. sordida*, Butler, Trans. Ent. Soc. 1877, p. 372, but is a very much darker insect.

SETINA, Schrank.

SETINA PUNCTILINEA, n. sp.

Male. Upperside—fore wing yellow; a black streak on base of costal margin, a spot below it, two small very indistinct subbasal

spots, one at end of the cell, and a more prominent marginal row of spots : hind wing and abdomen pale yellow. Thorax black-spotted ; legs black, streaked above.

Expanse $1\frac{0}{2}$ inch.

Ceylon. In coll. F. M. Mackwood and F. Moore.

Allied to the European *S. irrorella*.

SETINA DISCISIGNA, n. sp.

Female. Upperside pale yellow : fore wing tinged with ochreous along hind margin ; a black spot near base, a smaller spot at base of costa, and a more prominent spot at end of the cell : hind wing suffused with purplish-brown near the apex and along abdominal margin. Thorax and head yellow, both with black spots ; abdomen and legs purplish-brown, tip yellow. Underside—middle of fore wing dusky brown.

Expanse 1 inch.

Cherra (*Atkinson*). In coll. Dr. Staudinger and F. Moore.

SETINA NEBULOSA, n. sp.

Female. Upperside—fore wing yellow ; with a black basal spot, a broad irregular-bordered discal ochreous-brown band and confluent subbasal irregular-shaped band : hind wing cinereous white, with broad dusky indistinct submarginal fascia. Thorax yellow ; abdomen cinereous-white. Underside and legs paler.

Expanse $1\frac{2}{12}$ inch.

Darjiling (*Atkinson*). In coll. Dr. Staudinger and F. Moore.

SETINOCHROA, Felder.

Setinochroa, Feld. Nov. Voy. iv. pl. 106.

SETINOCHROA AURANTIACA, n. sp. (Plate III. fig. 12.)

Male. Upperside bright orange-yellow : fore wing with a black basal spot, two subbasal, a large spot at end of the cell, and a recurved submarginal series of four or five spots : hind wing ochreous-brown externally. Thorax black-spotted ; abdomen greyish-brown, tip yellow. Underside—middle of the fore wing ochreous brown, base of costa and subapical streaks black ; hind wing black-bordered at apex.

Expanse $1\frac{0}{2}$ inch.

Khasia hills (*G.-Austen*). In coll. F. Moore.

Allied to *S. infumata*, Feld. Nov. Voy. iv. pl. 106. fig. 16, but differs in being of a different yellow in colour, in the fore wing having the subbasal spots, and the hind wing having only a marginal blackish border.

SETINOCHROA PALLIDA, n. sp.

Male. Upperside—fore wing pale yellow, with small black spot at base, one at end of the cell, and a submarginal series of spots : hind wing pale ochreous-brown externally. Underside—fore wing pale ochreous-brown in the middle ; cell and apical spots very indistinct.

Expanse $1\frac{0}{2}$ inch.

Manpuri, N.W. India (*Horne*). In coll. F. Moore.

Differs from *S. infumata* in the wings being narrower, and of a paler colour both above and beneath.

SETINOCHROA POSTICA, n. sp.

Male. Upperside bright ochreous-yellow: fore wing with a small black spot at base, a prominent spot at end of the cell, and a recurved submarginal series: hind wing slightly brownish-ochreous, with a distinct black streak at end of the cell. Underside—fore wing ochreous-brown in the middle, with black apical spots; cell-streak in hind wing.

Expanse $\frac{10}{12}$ inch.

Dhurmsala, N.W. Himalayas. In coll. F. Moore.

NUDARIA, Haw.

Nudaria, Haw. Lep. Brit. p. 156.

NUDARIA FASCIATA, n. sp.

Male and female. Pale yellow, diaphanous: fore wing with a broad purple-brown band from the costa, decreasing to middle of hind margin, and lunular streaks on exterior margin; hind wing paler, slightly suffused with purple-brown at the base. Body yellowish-white; legs purple-brown above.

Expanse $\frac{10}{12}$ inch.

Darjiling (*Atkinson*). In coll. F. Moore.

Allied to *N. margaritacea*, Walk.; but that species differs in having the fore wing crossed by four distinct irregular sinuous bands.

EXPLANATION OF THE PLATES.

PLATE I.

- Fig. 1. *Paraona splendens*, p. 8.
 2. *Sidyma apicalis*, n. sp., p. 9.
 3. *Mahavira flavicollis* ♂, n. sp., p. 11.
 4. *Hesudra divisa* ♂, n. sp., p. 12.
 5. *Vamuna maculata* ♂, n. sp., p. 10.
 6. *Chrysægla ferrifasciata* ♂, n. sp., p. 13.
 7. *Gandhara serva*, p. 15.
 8. *Tarika varana*, p. 15.
 9. *Brunia antica*, p. 15.
 10. *Ghoria albocinerea*, n. sp., p. 13.
 11. *Vamuna bipars* ♂, n. sp., p. 10.
 12. *Churinga rufifrons* ♂, n. sp., p. 10.
 13. *Collita parva*, n. sp., p. 16.
 14. *Katha terminalis*, n. sp., p. 17.
 15. — *nigrifrons*, n. sp., p. 17.
 16. *Simareea basinota*, p. 14.

PLATE II.

- Fig. 1. *Chrysorabdia viridata* ♂, p. 19.
 2. *Capissa innotata* ♂, p. 19.
 3. — *pallens*, n. sp., p. 19.
 4. — *fasciata* ♂, n. sp., p. 20.
 5. *Tegulata basistriga*, n. sp., p. 22.
 6. — *protuberans* ♀, n. sp., p. 23.



PZS.1878 Pl II



J. Smith del.

Hanhart imp.

- Fig. 7. *Systropha auriflua*, n. sp., p. 18.
 8. *Doligoma brunnea*, n. sp., p. 20.
 9. *Mithuna quadriplaga*, n. sp., p. 21.
 10. *Cossa quadrisignata*, n. sp., p. 21.
 11. — *brunnea*, n. sp., p. 22.
 12. *Ranghania punctata*, n. sp., p. 22.
 13. *Teulisna tenuisigna*, n. sp., p. 24.
 14. *Macotasa biplagella* ♂, n. sp., p. 25.
 15. *Zadadra distorta* ♂, p. 25.
 16. *Prabhasa venosa* ♂, n. sp., p. 26.
 17. — *flavicosta* ♀, n. sp., p. 26.
 18. *Gampola fasciata* ♂, n. sp., p. 27.

PLATE III.

- Fig. 1. *Lyclene rubricosa*, n. sp., p. 30.
 2. — *radians*, n. sp., p. 30.
 3. — *prominens*, n. sp., p. 31.
 4. — *zebrina*, n. sp., p. 31.
 5. — *palmata*, n. sp., p. 31.
 6. — *interserta*, n. sp., p. 32.
 7. — *obsoleta*, n. sp., p. 32.
 8. — *assamica*, n. sp., p. 33.
 9. — *indistincta*, n. sp., p. 33.
 10. *Æmene maculifascia*, n. sp., p. 33.
 11. — *sinuata*, n. sp., p. 34.
 12. *Setinochroa aurantiaca*, n. sp., p. 35.
 13. *Bizone bellissima* ♂, n. sp., p. 27.
 14. — *coccinea* ♂, n. sp., p. 28.
 15. *Barsine flammealis*, n. sp., p. 28.
 16. — *gloriosa*, n. sp., p. 29.
 17. — *inflexa*, n. sp., p. 29.
 18. — *flavivenosa*, n. sp., p. 30.

2. On Birds collected in Costa Rica.

By ADOLPHE BOUCARD, C.M.Z.S.

[Received Nov. 15, 1877.]

(Plate IV.)

Costa Rica, the most southern of the five Republics known together under the name of "Central America," is said to contain 150,000 inhabitants, of which 100,000 live in the valleys of San José and Cartago. The remainder of the population is widely distributed in small villages, some of them lying at great distances from each other. Thence the difficulty of travelling in the interior of the country.

I arrived at Puntarenas, the Pacific port, on the 29th of December 1876, and remained in the country till the 30th May 1877—in all, five months.

My head quarters were San José, the capital. It is situated in the centre of a very fertile valley, about midway between the Atlantic and the Pacific, at the altitude of 4100 feet. It is said to contain 15,000 inhabitants. My intention was to take a house; but the rent, furniture, and servants were so dear that I stopped all the time at the Hotel Victor, where I was recommended to go.

My hunting-ground during the first weeks was in the valley of San José; but I was rather disappointed, birds being very scarce, which was due chiefly to the poverty of the vegetation, all the soil for many miles having been turned into coffee-plantations. The only places for hunting were the roads from San José to the towns and villages of Heredia, Alajuela, Tres Rios, Desamparados, &c.

On the trees and shrubs surrounding the coffee-plantations small flocks of birds were flying about. These flocks consisted of the following species—*Pyrgisoma cabanisi*, *Zonotrichia pileata*, *Buarremon chrysopogon*, *Saltator grandis*, *Catharus melpomene*, *Turdus grayi*, *Cyclorhis flavipectus*, *Elainea pagana*, *Myiarchus crinitus*, and several other species of Tanagridæ, Fringillidæ, and Tyrannidæ.

Among the Trochilidæ *Pyrrhophæna riefferi*, *Saucerottia sophiæ*, and *Chlorolampis osberti* were the only three species to be seen at that time.

In the gardens and maize-fields several species of *Spermophila* were found feeding on seeds.

In the barrancas (deep ravines occasioned by the large quantity of water which falls in the rainy season) the vegetation was more varied, and several species of Columbidae were met with. In all parts of the valley you always find the same species.

At the end of January, I made an excursion to the valley of San Carlos, in company with MM. Koschny and Meil de Fontenay, who proved to be very good travelling companions. The valley of San Carlos divides the Republic of Costa Rica from that of Nicaragua. It lies on the Atlantic slope, and extends as far as the river San Juan, which is the boundary of the two countries. It is quite a tropical climate, and considered very unhealthy. The forests are of the most magnificent description. There are scarcely any roads or inhabitants, except four or five settlers who are trying to raise cattle, and some few Nicaraguans who are engaged in extracting the juice of the india-rubber tree (*Siphonia elastica*).

To reach San Carlos we had to pass Sarzero and Laguna, two small villages lying at the summit of the Cordillera, near the volcano of Poas. Thence we had to descend gradually about 5000 feet through a very picturesque country.

We arrived the third day, at twelve, at the rancho where we intended to stop. From this rancho you can reach Greytown by water in little more than half a day. The return takes about six days, as you have then to go against the current.

The animal life is prodigious; flocks of birds are constantly passing to and fro. Early in the morning and at sunset large quantities of Howling Monkeys (*Mycetes palliatus*) are heard all around. They make a fearful noise; and one who has not heard them before may well fancy that the forest is thronged with Jaguars. These last-mentioned animals used to be very common; but now they are rather scarce, having been much persecuted.

Large flocks of *Ara macao*, *Chrysotis farinosa*, *Pionus senilis*, *Conurus astec*, and other species of Parrots are constantly passing in all directions.

This excursion lasted a fortnight. During that time I made a good collection of bird-skins, amongst them a female of the rare Cotingine bird, *Carpodectes nitidus*, quite new to science; also many other good species, as *Myrmotherula melæna*, *Urospatha martii*, *Prionirhynchus carinatus*, *Crypturus boucardi*, &c.

All the time I had to work at a great disadvantage. On the trunk of a tree I prepared my skins, with an empty box for a seat. Pigs and ants were always ready to do mischief; and I lost several good specimens of birds by pigs devouring them when they were drying in the sun.

My other excursions were to Cartago, Aguas Calientes, Navarro, Orozi, the Volcano of Irazu, Candelaria, Naranjo, &c.

Cartago is a town of about 10,000 inhabitants. It was formerly the capital; but owing to the frequent earthquakes felt there, and the great destruction of property occasioned by the same, the government was transferred to San José. The town is built at the base of the Volcano of Irazu, in a beautiful valley which varies from three to six miles in width and is about ten in length.

Aguas Calientes is a very prosperous village, only two miles and a half from Cartago. Although at such a short distance, it is much warmer, being well sheltered from the north wind, and about 250 feet lower.

A few miles further, going north-east, are the small villages of Navarro and Orozi, the localities for *Phainoptila melanozantha*, *Chlorophonia callophrys*, *Geotrygon costaricensis*, *Tetragonops frantzii*, &c.; and if you still go further north, you reach Tucuriqui, the locality where Arcé procured the type-specimen (♂) of *Carpodectes nitidus*. All these localities are from 500 to 2500 feet lower than Cartago, and the fauna is very rich.

Naranjo is the name of a very important hacienda, belonging to the Tenoco family. Lately a small village of the same name has been formed by the workmen of the hacienda. It stands on the road from San José to Limon (the Atlantic port).

This locality is very good for a naturalist, lying between the volcanoes of Irazu and Turrialba. In a few hours you can change your altitude from 1500 to 8000 feet or more if you choose; consequently there is a great variety of species to be got. The forests are luxuriant, due chiefly to the climate, which is very wet. It rains nearly all the year round. I found there many of the same species met with at San Carlos.

From Cartago I made several excursions to the Volcano of Irazu.

Up to the altitude of 6000 feet you only see maize- and wheat-plantations, occasionally some potreros (plains) where they fatten cattle, until you reach a small village called Potrero cerrado, where they cultivate potatoes extensively. A little further on begins the forest, where a species of oak tree is very abundant. Then the fauna changes entirely. You do not meet any more with the species of birds found in the valley, but such others as *Ptilogonys caudatus*, *Setophaga aurantiaca* and *S. torquata*, *Parula gutturalis*, *Pezopetes capitalis*, &c. Further on, at the altitude of from 7000 to 8000 feet

the forest is more dense, and the animal life is very abundant. This is the chief locality for *Pharomacrus costaricensis*, *Panterpe insignis*, *Dorycha bryantæ*, and *Turdus nigrescens*.

At the altitude of 8000 feet the forest ceases altogether, and you walk on scorix and ashes sent from the volcano of Irazu a long time ago. Many small trees and aromatic plants grow in the soil up to the summit of the mountain.

This is the locality for *Selasphorus flammula* and *S. scintilla*, which are seen sucking the flowers of mistletoes and heaths. Here also I met with my new species *Zonotrichia vulcani*. I reached the summit of the volcano, and slept there. On the other side, looking north-west, is the crater, which I have thoroughly explored.

Rancho redondo is a farm situated on the western slope of the Volcano of Irazu. It is also a good locality for *Phainoptila melano-xantha*, *Eugenes spectabilis*, *Chasmorhynchus tricarunculatus*, and other rare species.

Atenas is about thirty miles west from San José, on the road to Puntarenas.

San Mateo is on the Pacific slope, at the foot of the Aguacate mountain (rich in gold-mines), about thirty-eight miles from the port. The climate is quite tropical. Some of the species found at San Carlos are also met with here. It is also a rich locality for reptiles and insects.

Barranca is only about half a mile from the sea, and ten miles from Puntarenas. The village is built near the river of the same name.

Puntarenas is the port. Its name is very appropriate, as it stands on a sandy peninsula extending for about six miles. On one side is the sea, on the other a river; sometimes the width of this isthmus between the river and the sea is only fifty yards, and never more than one mile. It is excessively hot and unhealthy for a new comer. The vegetation is poor; but four miles from the town is a fine forest, where animal life is plentiful.

Altogether Costa Rica has been well explored by MM. Warzewicz Frantzius, Hoffmann, Ellendorf, Carmiol, father and son, Endrés, Arcé, Zeledon, Cooper, and others.

Up to this day 520 species of birds (some doubtful) are recorded as having been collected in that country; and I feel well satisfied when I think that in a country so well worked up I have been able to obtain several new species and some great rarities—such as both sexes of *Phainoptila melano-xantha*, a new genus and new species just described by Mr. Osbert Salvin, *Carpodectes nitidus* (♀), *Catharus frantzii*, *Catharus gracilirostris*, *Turdus nigrescens*, *Turdus obsoletus*, *Parula gutturalis*, *Pezopetes capitalis*, *Melozone leucotis*, *Eugenes spectabilis*, *Selasphorus scintilla*, *Selasphorus flammula*, *Oreopyra hemileuca*, *Oreopyra cinereicauda*, *Panterpe insignis*, *Conurus hoffmanni*, *Geotrygon costaricensis*, *Dendrortyx leucophrys*, *Crypturus boucardi*, &c. &c.

The total number of species which I collected is about 250; but I worked very hard to obtain this result, and until the time of my

departure I did not lose a single day, and often I had no repose from morning till night. I could easily have obtained a larger number of specimens; but I did not collect very well-known and common birds which were already well represented in my collection.

I consider Costa Rica one of the worst places for making collections, in consequence of the difficulty of transport, the bad roads, and the great expense which these deficiencies occasion. You must carry every thing with you, live and sleep as you can and where you can, sometimes in the most miserable huts, sometimes in the forest.

At first I was not able to find help at any price. A few hunters, willing to work for me at high pay, made such bad skins that I was obliged to dismiss them.

Others to whom I offered good prices for birds in the flesh never came again after I gave them powder and shot. At last, a little before my departure, I met with two good hunters, whom I employed a few days, and did very well with them; but it was rather too late, the time of my departure having arrived, and the best season for birds being over.

The classification which I have followed in the following list is that of my 'Catalogus Avium.'

Ordo CRYPTURI.

Family TINAMIDÆ.

1. NOTHOCERCUS BONAPARTII, Gray.

Tinamus frantzii, Lawr.

Native name "Gallina del monte." Only one specimen procured, in May 1877, at Rio Navarro, at the base of the Candelaria Mountains, twelve miles from San José.

This seems to be a rare species; the typical specimen of *T. frantzii*, Lawr., was collected at Cervantes by J. Zeledon. Cervantes is not far from Rio Navarro.

Like all Tinamidæ, it is found in the dense parts of the forest, where it feeds on insects and seeds. They can be easily detected by the noise they make when scratching the ground in search of food. They go in pairs, repeatedly calling one another. When fearing danger they run with much rapidity.

2. CRYPTURUS BOUCARDI, Scl.

The type of this species was from Mexico, and not from Guatemala as stated in Gray's 'Hand-list of Birds.' As well as I can remember, the first specimen (the type of this species) was obtained by me at Playa Vicente, a small village up the river Papaloapam, the mouth of which is at Alvarado, on the Atlantic, between Vera Cruz and Minatitlan.

As far as I know, all specimens of this bird have been obtained in the tropical forests a few hundred feet above the sea-level; but it is an interesting fact that this species has been obtained also in Guatemala and Costa Rica.

Only one specimen (♀) collected, at San Carlos, where it was rather abundant in February. They are rather easy to detect, in consequence of a plaintive cry which they repeat frequently, as if calling one another.

The flesh is white and delicious to eat.

I have also one specimen, obtained at San Carlos, which is much darker than *C. boucardi*. It has not any of the black and yellow spots, either on the back or on the secondaries and tertiaries, which are so conspicuous in the former. Instead of that the secondaries are nearly black, bordered with rufous grey, the tertiaries are rufous grey, the back is rather dark rufous, darker on the rump, the upper tail-coverts are rufous, with an indication of yellow and black spots, as in *C. boucardi*. On the underside the abdomen is nearly of the same grey colour as the breast, slightly rufous on each side.

Ordo GALLINÆ.

Family CRACIDÆ.

3. PENELOPE PURPURASCENS, Wagl.

Native name "Faisan."

Hab. Volcan de Irazu.

Rather common in the forests on the slopes of the volcano. It is also found in San Carlos, showing that it lives indifferently in low or high altitudes.

4. CHAMÆPETES UNICOLOR, Salv.

Hab. Volcan de Irazu.

They are in great demand for food in San José, where they sell at from four to eight shillings.

Subfamily CRACINÆ.

5. CRAX GLOBICERA, L.

Native name "Pavo."

Hab. San Carlos, Volcan de Irazu, Naranjo.

Rather common.

Subfamily ODONTOPHORINÆ.

6. ODONTOPHORUS GUTTATUS, Gould.

Native name "Perdiz."

Hab. Curridabat, near San José.

Two specimens, one male and one female, killed in March.

7. DENDRORTYX LEUCOPHRYS, Gould.

One specimen, from the Volcano of Irazu, May. Killed at the altitude of 7000 feet. It was scratching the ground in search of food.

8. ORTYX LEYLANDI, Moore.

Valley of San José. Common in the coffee-plantations during the

rainy season, from May to December, rare in the other months; then it disappears completely from the valley. They are also met with in small flocks in the plains. They run very fast.

Ordo COLUMBÆ.

Family COLUMBIDÆ.

Subfamily COLUMBINÆ.

9. COLUMBA ALBILINEATA, Gray.

Several specimens from the Volcano of Irazu, May. Is found in flocks of ten or twelve, feeding on seeds. I have seen them coming from all directions to drink at a spring of mineral water near Desamparados.

10. COLUMBA SUBVINACEA, Lawr.

Only one specimen, from Candelaria, May. Very rare.

11. ZENAUDURA CAROLINENSIS, L.

Several specimens, from San José, January to May.

Subfamily GOURINÆ.

12. CHAMÆPELIA PASSERINA, L.

Common near San José, January to May.

13. CHAMÆPELIA RUFIPENNIS, Gray.

Very abundant at Puntarenas in May.

14. LEPTOPTILA VERREAUXI, Bp.

Several specimens from San José, January to March.

15. LEPTOPTILA CASSINI, Lawr.

Only one specimen, from San Carlos, February. Inhabits the forest. I also found two eggs of this species on a small tree. They are uniform white. The male was sitting on the eggs.

16. GEOTRYGON MONTANA.

San Carlos, February.

17. GEOTRYGON COSTARICENSIS, Lawr.

Several specimens killed on the mountain of Candelaria, at the altitude of from 3000 to 4000 feet.

Feeds on seeds, and very likely also on insects. The crop of one of the specimens dissected, and which I have here, is full of small seeds. I have always seen them on the ground, going singly. The sexes are exactly alike.

18. GEOTRYGON CHIRIQUENSIS, Sclat.

Geotrygon cæruleiceps, Lawr.

Native name "Paloma del Monte."

Volcano of Irazu and Candelaria.

This is a scarce species in Costa Rica. Like the former, it has the

same habits as the Tinamidæ and Odontophorinæ of going about on the ground. I have never seen it perched.

Ordo LIMICOLÆ.

Family CHARADRIIDÆ.

19. OXYECHUS VOCIFERUS, L.

Valley of San José.

Excessively common in the plains, where they are seen constantly running about searching for food, and even catching grasshoppers and small insects on the wing. When surprised they run very fast, at the same time crying, as if to advise one another of some danger.

Family SCOLOPACIDÆ.

20. TRINGOIDES MACULARIUS, L.

Several specimens shot in the valley of San José. They are found along the streams, flying from one stone to another, or searching for food close to the water. When surprised they take to flight, emitting a sharp cry, similar to *pit, pit, pit*.

Ordo HERODIONES.

Family PLATALEIDÆ.

21. PLATALEA AJAJA, L.

One specimen near San José, April.

Ordo ANSERES.

Subfamily ANATINÆ.

22. DENDROCYGNA AUTUMNALIS, L.

Native name "Pato."

Common at the laguna of Cartago, where the division of the waters takes place, either for the Atlantic or the Pacific.

Ordo ACCIPITRES.

Family FALCONIDÆ.

23. MICRASTUR SEMITORQUATUS, Vieill.

One specimen, killed in the forests of Candelaria Mountains, May.

24. BUTEO LATISSIMUS, Wils.

Buteo pennsylvanicus, Wils.

One specimen, killed at San José in January.

25. URUBITINGA GHIESBREGHTI, Du Bus.

One specimen, from Naranjo, April. Rare.

26. THRASAËTUS HARPYIA, L.

Native name "Aguila."

I have seen one specimen alive in San José. It was caught in the

Candelaria Mountains. It was kept in a large cage, and seems quite at home. When you approach it, it erects its crest, and presents then a very imposing sight.

27. *ELANOIDES FURCATUS*, L.

One specimen from Naranjo. I saw several in a place cleared for sowing. They sat motionless for hours at the top of the highest trees, probably watching for their prey.

28. *LEPTODON UNCINATUS*, Temm.

Native name "Gavilan."

One specimen, from Naranjo, April. This bird has a strong cry, which sounds like *oua, oua, oua*, repeated several times in succession. It resembles very much the cry of the Peacock when asking for rain (as vulgarly said). It is so loud that you can hear it at a long distance. The capture of my specimen was due to it. It was perched on the top of a high tree in the forest; and if it had not been for its cry, I do not think I should have detected it. Several of these birds were at about half a mile one from the other, and crying in succession; and it occurs to me that each one takes possession of a certain part of the forest and admits of no intruder.

29. *CERCHNEIS SPARVERIUS*, L.

Common in all altitudes, January to May.

Family VULTURIDÆ.

30. *CATHARTES PAPA*, L.

Native name "Rey de los Zopilotes."

Seen at San Mateo in May.

31. *CATHARISTES ATRATUS*, Barth.

Native name "Zopilote."

Common everywhere all the year round.

32. *ÆNOPS AURA*, L.

Native name "Zopilote de cabeza colorada."

San José, January to May.

Ordo STRIGES.

Family BUBONIDÆ.

33. *SCOPS BRASILIANUS*, Gm.

Native name "Lechuza."

One specimen from San José. It was perched on a small tree in company with two adult specimens. I killed the young and the female with the same shot.

34. *LOPHOSTRIX STRICKLANDI*, Sclat. & Salv.

San Carlos, February.

Ordo PSITTACI.

Subfamily ARAINÆ.

35. *ARA MACAO*, L.

Native name "Guacamaya."

Common at San Carlos. Every morning they fly about in large flocks. In the daytime you can see them in the forest eating fruit; they are easily detected by the noise they make, and by the rejected pieces of fruit constantly falling down from the trees on which they are perched.

36. *ARA MILITARIS*, L.

San Carlos, Sarzero, February.

37. *CONURUS HOFFMANNI*, Cab.

Native name "Perico."

Several specimens killed at the foot of the Candelaria Mountains. I have also seen small flocks at Aguas Calientes, near Cartago. When flying they appear excessively beautiful: this is due principally to the conspicuous colour of their wings.

38. *CONURUS ASTEC*, Souancé.

Native name "Perico."

One specimen killed at San Carlos, amongst a large flock eating fruit and seeds in the forest, February.

39. *BROTOGERYS TOVI*, Gm.

Native name "Periquito."

Common at San Carlos, February.

40. *PIONUS SENILIS*, Spix.

Native name "Cotora."

Common at San Carlos in February. Found in company with *Conurus astec*.

41. *CHRYBOTIS FARINOSA*, Bodd.

Chrysotis pulverulenta, Gm.

Native name "Loro."

Common at San Carlos in February.

Ordo COCCYGES.

Subordo ZYGODACTYLÆ.

Family RAMPHASTIDÆ.

42. *RAMPHASTOS TOCARD*.

Native name "Pico de canoa."

Common at San Carlos in February.

43. *PTEROGLOSSUS TORQUATUS*, Gm.

Common at San Carlos in February.

44. *PTEROGLOSSUS FRANTZII*, Cab.

Common at San Carlos in February.

45. *SELENIDERA SPECTABILIS*, Cass.

Naranjo, April.

46. *AULACORAMPHUS CÆRULEOGULARIS*, Gould.

Naranjo, April.

All these species are found in the forests in small flocks of from ten to fifteen. They live chiefly on fruit.

Family *CAPITONIDÆ*.Subfamily *CAPITONINÆ*.47. *TETRAGONOPS FRANTZII*, Sclat.

Several specimens from Navarro, May. Found in the forests near the streams.

48. *CAPITO BOURCIERI*, Lafr.

Two specimens, from Orozi and Navarro.

Family *BUCCONIDÆ*.49. *MALACOPTILA PANAMENSIS*, Lafr.

Two specimens, male and female, killed at San Carlos in February. Always seen in the forests.

Family *GALBULIDÆ*.50. *GALBULA MELANOGENIA*, Sclat.

Common at San Carlos in February.

Family *CUCULIDÆ*.Subfamily *CROTOPHAGINÆ*.51. *CROTOPHAGA SULCIROSTRIS*, Sw.

Very common in the valley of San José on the edges of the coffee-plantations. They go in flocks of from ten to fifteen, flying from one bush to another. They do not notice the presence of man, and are commonly called "Garapatero" (eater of Garapatas, a common parasite which lives principally on cattle, and also on men). They are often seen on the back of animals, eating the insects which infest them. The cattle seem to enjoy very much the close company of this auxiliary, which does such good service for them. I have one egg of this species, which is of the size of a Pigeon's, all white.

Subfamily *COCCYZINÆ*.52. *COCCYZUS MINOR*, Gm.

One specimen, from Puntarenas, May. This is the first time that this species is recorded from Costa Rica.

53. *PIAYA MEHLERI*, Bp.

Several specimens from San José. It is called commonly "Bobo de pecho aplomado." The expression "Bobo" means imbecile, because it is very tame, and you can shoot it very easily. I have always seen them on the edges of the coffee-plantations.

54. *MOROCOCCYX ERYTHROPYGUS*, Less.

One specimen, from Atenas, May. It was on the side of the road, where I observed it for several minutes before I killed it. It jumped from one stone to another, then came down and scratched the ground for insects, then perched on a low branch, and so on, without taking any notice of me, although I was only a few yards distant.

Subordo *HETERODACTYLÆ*.Family *TROGONIDÆ*.55. *PHAROMACRUS MOCINNO*, Llave, var. *costaricensis*, Gould.

Native name "Quetzal."

A large number of specimens, from the Volcano of Irazu, Navarro, Candelaria, Naranjo, in fact from all the mountains around San José and Cartago. Very difficult to get. It is only by imitating the cry of the female that the men of the country can get a shot at the males. They keep in the denser parts of the forest, chiefly in the places called "barrancas" (deep ravines, very difficult of access). They feed on seeds and fruit. In May (the season of acorns) they are found in small flocks of ten to twelve on the robbleries, and can then be easily killed. During the breeding-season they go in pairs, male and female, constantly calling one another.

For further details on the habits of this bird, see part xi. of 'Ornithological Miscellany'¹.

56. *TROGON MASSENA*, Gould.

San Carlos, February. I have always seen these birds in the forests. They perch high, and remain a long time stationary.

57. *TROGON PUELLA*, Gould.

Several specimens killed at Navarro and in the Candelaria Mountains in May.

Subordo *ANISODACTYLÆ*.Subfamily *ALCEDININÆ*.58. *CERYLE CABANISI*, Tsch.

Native name "Martin pescador."

Common everywhere, January to May.

Family *MOMOTIDÆ*.59. *MOMOTUS LESSONI*, Less.

Four specimens, from San José, January, March. It is vulgarly

¹ I have sent a full account of my observations on this species to Mr. G. D. Rowley, which he has published in his interesting work.

called "Bobo," because it is quite tame and easy to kill. I saw these birds chiefly in the coffee-plantations near the streams. Its cry has rather a hollow sound, sometimes like the word "mou mot," or "mot mot," from which the name of the genus is derived.

60. *UROSPATHA MARTII*, Spix.

Several specimens from San Carlos, killed in February. Always seen in the forest, where they make a fearful noise calling one another. Its note has some resemblance to the cry of the former species, but is much stronger and more hollow. They are easily killed at first, but they are wilder after a few shots. I have met with them in small flocks.

61. *PRIONIRHYNCHUS CARINATUS*, Du Bus.

One specimen, a female, collected at San Carlos, February. Rare. Goes by pairs in the forest. This is the first time that this species has been found so far south.

62. *EUMOMOTA SUPERCILIARIS*, Sw.

One specimen, from Barranca, near Puntarenas, May. Like *Momotus lessoni* and other Momotidæ, it will remain for a long time perched on the same branch, and the only sign of its being alive is the frequent movement of its tail.

Ordo PICI.

Family PICIDÆ.

63. *DYCTIOPICUS JARDINEI*, Malh.

Native name "Carpintero."

Two specimens from the Volcano of Irazu and from Navarro, January and May 1877.

64. *CENTURUS HOFFMANNI*, Cab.

Two specimens, from San José, January, and Cartago, April; killed in the coffee-plantations. Also one specimen from Puntarenas which I cannot possibly separate from this species, although it is a much smaller bird.

65. *CENTURUS PUCHERANI*, Malh.

Two specimens, one from San Carlos, February, the other from Naranjo, April.

66. *MELANERPES FORMICIVORUS*, Sw.

Several specimens from the Volcano of Irazu, May 1877. I have seen some also at Naranjo.

Ordo PASSERES.

Subordo OSCINES.

OSCINES DENTIROSTRES.

Family TURDIDÆ.

67. *TURDUS GRAYI*, Bp.

Native name "Giguira."

Several specimens from San José, where they are found in large quantities during the fruit-season. They are particularly fond of a small fruit called in the country "cereza." My specimens differ widely from the ordinary form of *T. grayi* in their general coloration: instead of being rufous, they are ashy grey with a rufous reflection, but so different in coloration that it is impossible to mistake one for the other; the sides of the abdomen are of the same colour as the underside plumage, whereas in *T. grayi* they are rufous, nearly red.

I have two eggs of this bird, found in one nest built in the centre of an aloe growing on the road. They are green, with rufous spots.

68. *TURDUS PLEBEIUS*, Cab.

One specimen, from Navarro, April.

69. *TURDUS NIGRESCENS*, Cab.

Several specimens from the Volcano of Irazu.

I never saw this species anywhere else. They are found in small flocks in the oak-tree region, at the altitude of from 6000 to 10000 feet. I found a nest containing two eggs. They are of a pale uniform green.

70. *TURDUS LEUCAUCHEN*.

Only one specimen, from Orozi, May.

71. *TURDUS OBSOLETUS*, Lawr.

Only one, female specimen, from Naranjo, April. This species seems to be rare. It lives in the forest.

72. *CATHARUS MELPOMENE*, Cab.

Native name "Paxaro ingles" (English bird); I could not learn why.

Many specimens, from San José and Cartago, where they are found on the edges of the coffee-plantations. They are often seen on the ground searching for insects. They sing beautifully.

73. *CATHARUS FRANTZII*, Cab.

Two specimens from Navarro, May. Very rare.

74. *CATHARUS GRACILIROSTRIS*, Salv.

Two specimens from the Volcano of Irazu, April. Very rare.

Family SYLVIIDÆ.

75. MYIADESTES MELANOPS, Salv.

Several specimens, from Navarro, May 1877. Always found in the forest, where they are easily detected in consequence of their beautiful and clear song. It is short; but nothing could be more perfect in tone. Occasionally they are brought alive for sale to San José; but they are not easily domesticated.

Family TROGLODYTIDÆ.

76. TROGLODYTES INTERMEDIUS, Cab.

Troglodytes hypaëdon, Sclat.

Many specimens, from San José, Cartago, and Naranjo. It is vulgarly called "Salta pared," which means "jump-the-wall." They are common in the gardens from January to May.

77. THRYOPHILUS MODESTUS, Cab.

Many specimens, from San José, Cartago, and San Mateo. I have always found them on the edges of the coffee-plantations. January to May.

✓ 78. THRYOPHILUS CASTANEUS, Lawr.

Several specimens, from San Carlos; killed in February. Found in the forests near the habitations.

✓ 79. THRYOPHILUS PLEUROSTICTUS, Sclat.

Two specimens, from Puntarenas, May. Killed in the forest close to the sea.

80. THRYOPHILUS THORACICUS, Salv.

One single specimen, from San Carlos, February. Rare.

81. CAMPYLORHYNCHUS ZONATUS, Less.

Only one specimen, killed at San Mateo in May. They go in small flocks, making a great noise as they fly from one tree to another in the open spaces in the forest.

82. HENICORHINA LEUCOSTICTA, Cab.

Several specimens, from San Carlos and Orozi. Always found in the forest on the ground.

83. HENICORHINA LEUCOPHRYS, Tsch.

Only one specimen, from Navarro, May.

Family MNIOTILTIDÆ.

84. SIURUS NOVEBORACENSIS, Gm.

One specimen, from San José, March.

85. SIURUS AUROCAPILLUS, L.

Two specimens, from San José, January and March.

86. *MNIOTILTA VARIA*, L.

San Carlos, February.

87. *PARULA GUTTURALIS*, Cab.

Several specimens, from the Volcano of Irazu, April and May.
Killed on the oak trees at an altitude of 6000 feet.

88. *HELMINTHOPHAGA PEREGRINA*, Wils.

Several specimens, from San José, January, March.

89. *DENDRÆCA BLACKBURNIÆ*, Gm.

One specimen, from Naranjo, April.

90. *DENDRÆCA PENSYLVANICA*, L.

San Carlos, February.

91. *DENDRÆCA ÆSTIVA*, Gm.

Several specimens, from San José, January, March.

92. *DENDRÆCA VIEILLOTI*, Cassin.

One single specimen, from Puntarenas, killed in May on the mangrove trees, in close proximity to the river.

93. *GEOTHLYPIS TRICHAS*, L.

Several specimens, from San José and Cartago, January to May.

94. *GEOTHLYPIS POLIOCEPHALA*, Baird, var. *caninucha*, Ridgw.

Only two specimens, from San José, killed in January and February.

95. *MYODIOCTES PUSILLUS*, Wils.

Several specimens, killed at San José in January.

96. *BASILEUTERUS MESOCHRYsus*, Sclat.

Many specimens, from San José and Cartago, January to May.

97. *BASILEUTERUS CULICIVORUS*, Licht.

San José, January to May.

98. *BASILEUTERUS UROPYGIALIS*, Sclat.

Only one specimen, from San Carlos, killed in February. It is a very rare species, living along the streams in the forest. It never rests, but is constantly going up or down the river from one place to another, sitting on stones or scratching the ground. I saw several specimens in the same place, but could only get one, as it is a very wild bird.

99. *SETOPHAGA RUTICILLA*, L.

Several specimens, from San José and Cartago, January and April.

100. *SETOPHAGA AURANTIACA*, Baird.

Several specimens from Cartago and Naranjo. This species inhabits the forests; in the middle of the day they go along the streams, flying from one tree to another, feeding on insects. I have always seen them going in pairs.

101. *SETOPHAGA TORQUATA*, Baird.

Several specimens of this rare species, all of them killed in the forest on the Volcano of Irazu. Always seen in pairs. The female differs very little from the male.

Family VIREONIDÆ.

102. *VIREOSYLVA FLAVOVIRIDIS*, Cass.

One specimen, from San José, April.

103. *VIREOSYLVA OLIVACEA*, Linn.

San José, January to May.

104. *VIREOSYLVA PHILADELPHICA*, Cass.

Several specimens, from San José, January.

105. *VIREOSYLVA FLAVIFRONS*, Vieill.

Several specimens, from San José, January, March.

106. *VIREOSYLVA JOSEPHÆ*, Sclat.

Only one specimen, from Naranjo, April.

107. *HYLOPHILUS DECURTATUS*, Bp.

One specimen, from San José, May.

108. *CYCLORHIS FLAVIPECTUS*, Sclat.

Cyclorhis subflavescens, Cab.

Several specimens, from San José, February, March, and April.

Family AMPELIDÆ.

109. *PTILOGONYS CAUDATUS*, Cab.

Several specimens, killed in the forest of oak trees on the Volcano of Irazu; also some specimens from Navarro, May.

110. *PHAINOPTILA MELANOXANTHA*, Salv.

Several specimens of both sexes, from Navarro and Rancho Redondo, January to May. Found in pairs along the streams—not in the region of the oak trees, as suggested by Mr. G. Dawson Rowley, but much lower down, at an altitude of about 4000 feet, and in semitropical forests. The two sexes of this rare species have been beautifully figured, from specimens obtained by me, in the 'Ornithological Miscellany,' part x.

OSCINES TENUIROSTRES.

Family CÆREBIDÆ.

111. DIGLOSSA PLUMBEA, Cab.

Several specimens, from Cartago, Navarro, Naranjo, Volcano of Irazu, and La Laguna; all of them killed at the altitude of from 4000 to 8000 feet.

112. DACNIS VENUSTA, Lawr.

Several specimens, from Candelaria, May.

113. CHLOROPHANES SPIZA, var. *guatemalensis*, Sclat.

One specimen, from Naranjo, April.

OSCINES CONIROSTRES.

Family TANAGRIDÆ.

114. CHLOROPHONIA CALLOPHRYS, Cab.

Several specimens of this fine species, from Navarro and Candelaria, May.

115. EUPHONIA ELEGANTISSIMA, Bp.

Several specimens, from San José. Found on the road feeding on the fruit of the mistletoe. These birds sing beautifully, and are easily domesticated.

116. EUPHONIA CRASSIROSTRIS, Sclat.

Only one specimen, from Cartago, April.

117. EUPHONIA GOULDI, Sclat.

Two specimens, male and female, from San Carlos, February.

118. CALLISTE ICTEROCEPHALA, Bp.

Calliste frantzii, Cab.

Two specimens, from Naranjo and Orozi, June, May. Rather abundant on the edges of the forests where clearings have been opened.

119. CALLISTE GYROLOIDES, Lafr.

Navarro, May.

120. CALLISTE LARVATA, Du Bus.

Calliste franciscæ, Lafr.

Several specimens, from Naranjo, Orozi, and San Carlos.

121. CALLISTE DOWII, Salv.

Several specimens, from Navarro, May. Rare.

122. TANAGRA CANA, Sw.

Tanagra diaconus, Less.

Several specimens, from San José, January. Rather common on the trees bordering the coffee-plantations.

123. *TANAGRA PALMARUM*, Max.*Tanagra melanoptera*, Hartl.

Common at Naranjo, April; San José, March to May.

124. *RAMPHOCELUS PASSERINII*, Bp.

San Carlos, February; Naranjo, April. Found commonly in the "rastrojos" (abandoned plantations near the habitations). Always seen in pairs; but several pairs are often met with near one another in the same locality.

125. *PHLOGOTHRAUPIS SANGUINOLENTA*, Less.

Orozi, May. I have seen them in pairs, like the above species; but sometimes five or six may be seen eating fruits or seeds on the same tree.

126. *PYRANGA RUBRA*, L.

San José, April.

127. *PYRANGA ERYTHROMELÆNA*, Licht.

Naranjo, April; Candelaria, May. In the forest.

128. *PYRANGA BIDENTATA*, Sw.

Several specimens, from the forests of Navarro and Volcano of Irazu, May.

129. *PHŒNICOTHRAUPIS FUSCICAUDA*, Cab.

Two specimens, male and female, from San Carlos, February. Found in the forest, perching on branches near the ground. Feeds on insects.

130. *TACHYPHONUS LUCTUOSUS*, Lafr. & D'Orb.

San Carlos, February. Feeding on insects in the forest.

131. *TACHYPHONUS DELATTRII*, Lafr.

San Mateo, May. I have always found these birds in company with the above species, and many others, where large quantities of migratory ants were travelling. They went in the same direction as the ants; and now and then I saw them hopping to the ground, and perching on low branches. Doubtless they were feeding on ants.

132. *CHLOROSPINGUS ALBITEMPORALIS*, Lafr.

Several specimens collected at La Laguna, Naranjo, and Navarro, February, April, and May. This species seems to be widely distributed. I have seen them in the forest, chiefly at places where openings had been made for sowing-purposes.

133. *BUARREMON CAPITALIS*, Cab.*Pezopetes capitalis*, Cab.

Several specimens from the Volcano of Irazu, April and May. The two sexes are exactly alike. They go in pairs; but several pairs

may be seen at a short distance from one another. They perch on the lower branches in the forest, but are most of their time busy scratching the ground in search of insects. They make such a noise in doing so, that at first I thought they were *Odontophori* or *Tinami*. The sexes are constantly calling each other; and as soon as you see one appearing, the other follows shortly after. They run fast. I have never seen this bird anywhere else.

134. *BUARREMON BRUNNEINUCHUS*, Lafr.

Several specimens from Cartago, Navarro, and Rancho Redondo, April, May. Rather a rare species in Costa Rica; all my specimens were obtained on the edges of abandoned plantations at the altitude of 4500 feet.

135. *BUARREMON CHRYSOPOGON*, Bp.

Many specimens, from San José and Cartago.

136. *BUARREMON TIBIALIS*, Lawr.

Several specimens, from Navarro and the Volcano of Irazu, May. Rather scarce; found in the forest, principally along the streams.

137. *ARREMON AURANTIROSTRIS*, Lafr.

Arremon rufidorsalis, Cass.

One specimen, from San Carlos, February.

138. *SALTATOR MAGNOIDES*, Lafr.

Several specimens, from San José and Cartago. Common in March and April.

139. *SALTATOR GRANDIS*, Lafr.

Several specimens, from San José. Common in March, April, and May.

Family FRINGILLIDÆ.

140. *CHRYSOMITRIS BRYANTII*, Cass.

One male specimen, from the Volcano of Irazu, May. Rare.

Subfamily PASSERELLINÆ.

141. *EMBERNAGRA STRIATICEPS*, Lafr.

One specimen, from San Carlos, February. Killed close to the rancho. I have also seen this species at Puntarenas.

142. *PYRGISOMA CABANISI*, Sclat. & Salv.

Many specimens, from San José and Cartago, January to May. Killed on a sort of hawthorn edging the coffee-plantations.

143. *PYRGISOMA LEUCOTE*, Cab.

Melozona leucotis, Cab.

Several specimens, from San José, February, and Cartago, April. Very rare.

144. ZONOTRICHIA VULCANI, sp. n. (Plate IV.)

Supra cinereo-olivacea, pileo, dorso alis et cauda pallide nigris, plumarum marginibus olivascentibus, secundariorum dorso proximorum marginibus externis rufis; subtus plumbescenti-cinerea unicolor, rostro et pedibus pallide flavis.

Forehead olivaceous grey, with the central extremity of each feather nearly black; back and wing-coverts of the same colour, but the black is darker and very conspicuous in each feather; tail-coverts olivaceous; upper surface of the tail almost black, with olivaceous fringes; underside uniform plumbeous grey, slightly darker on the breast and sides of the abdomen; under tail-coverts olivaceous grey; underside of the wings and tail about the same grey as the abdomen, with silky reflections; primaries and tertiaries black, with olivaceous fringes; secondaries with the fringes wider and rufous in the upper part; the upper mandible of the beak nearly red, then black, with white tip; under mandible fleshy yellow; toes of the same colour. Full length $6\frac{7}{8}$ inches, wing $3\frac{1}{8}$, tail 3.

There is no difference whatever between the male and female, except that the latter is a trifle smaller.

The young is very much like young of *Junco*, *Peucea* or *Melospiza*; the upperside and underside are olivaceous grey, with the centre of each feather black; the fringes of the upper wing-coverts are wider than in the adult specimens and more rufous.

Several specimens, from the Volcano of Irazu, obtained at the altitude of 10,000 feet.

145. ZONOTRICHIA PILEATA, Bodd.

Many specimens, from San José, Cartago, Sarzero, and Volcano of Irazu. Vulgarly called "Come-maiz" (Eat-maize), because they are very injurious to the maize-plantation crops. It is met everywhere, even in the gardens, and takes the place in America of the *Passer domesticus* in Europe. I have seen them at nearly all altitudes. The eggs of this bird are green, with rufous spots all over at the broader end.

Subfamily CYANOSPIZINÆ.

146. VOLATINIA JACARINA, L.

San José, March.

147. CYANOSPIZA CIRIS, L.

One specimen from Tres Rios, January. Obtained in a curious way. Having shot what I thought to be *Cyanospiza cyanea*, I could not find my bird where I thought I saw it fall, but during my search I found this specimen of *Cyanospiza ciris*, quite dead. It was so thin that it had evidently died from cold and hunger; and I attribute to this fact the body not being decomposed, as I have no doubt that it had been dead for some time. I took great care in skinning the bird; and I had the satisfaction to make a fine skin of it, which is now exhibited.

148. *CYANOSPIZA CYANEA*, L.

San José, March.

149. *PHONIPARA PUSILLA*, Sw.

Several specimens, from San José, January and February. Found in the rastrojos.

Subfamily SPERMOPHILINÆ.

150. *HEDYMELES LUDOVICIANA*, L.

One specimen, from San José, January.

151. *PHEUCTICUS TIBIALIS*, Baird.

Several specimens, from Navarro and the Volcano of Irazu, May.

152. *SPERMOPHILA MORELETI*, Pucher.

Several specimens, from San José, March and April. Very common in the maize-plantations in the time of the harvest.

153. *SPERMOPHILA CORVINA*, Sclat.

Two specimens, male and female, from San Carlos, February.

154. *SPERMOPHILA AURITA*, Bp.

Spermophila semicollaris, Lawr.

One specimen, male, from San Mateo.

Subfamily EMBERIZINÆ.

155. *EUSPIZA AMERICANA*, Gm.

Several specimens, from San José and Potrero cerrado (Volcano of Irazu). Excessively common in March, flying about on the roads in large flocks. It is then very fat, and delicious eating.

OSCINES CULTRIROSTRES.

Family ICTERIDÆ.

156. *OCYALUS WAGLERI*, Gray and Mitch.

Orozi, May. I have also seen many specimens at San Carlos and Naranjo.

157. *OSTINOPS MONTEZUMÆ*, Less.

Very common at San Carlos and Naranjo, February. The sight of their nests hanging close together at the extremity of the branches on the trees is very peculiar. They select the highest trees left where the forest has been cleared; so that they cannot escape detection. I have seen as many as thirty nests in one single tree. They make a fearful noise when they come and go out of their nests.

158. *CASSICUS PREVOSTI*, Less.

One specimen, from San José, March. Killed on the bushes forming the edges of coffee-plantations. I have seen many other specimens.

159. *ICTERUS BALTIMORE*, L.

Several specimens, from San José, March and April. Called vulgarly "Cacique de Naranjo" (*Cacicus* of orange-trees); because they are very fond of this fruit.

160. *ICTERUS PROSTHEMELAS*, Strickl.

One specimen, from Naranjo, April.

161. *MOLOTHRUS ÆNEUS*, Wagl.

Very common at San José, February to May. They go about in large flocks, and are often seen in the gardens of the town, as well as on the pavement in the streets.

162. *STURNELLA LUDOVICIANA*, L.

Very common in the "potreros" (plains), principally at Cartago, April and May.

Family CORVIDÆ.

163. *PSILORHINUS MORIO*, Licht.

Several specimens, from San José. Very common in the coffee-plantations. Called vulgarly "Pepe;" because their cry is an imitation of that Spanish word, in English "papa." As soon as they perceive any body, man or beast, moving about they fly, making a fearful noise with their cries of pa, pa, pa. You can depend upon it that when you hear these birds crying some one is near at hand.

Subordo TRACHEOPHONÆ.

Family DENDROCOLAPTIDÆ.

164. *SYNALLAXIS ERYTHROPS*, Sclat.

Two specimens, from the Volcano of Irazu, March, and Navarro, May. In the forest.

165. *SYNALLAXIS PUDICA*, Sclat.

Synallaxis nigrifumosa, Lawr.

One specimen, from Naranjo, April; killed on the edge of the sugar plantations.

166. *PSEUDOCOLAPTES BOISSONEAUTI*, Lafr. (?).

One specimen from Navarro, May. It differs from the other specimens which I have of *P. boissoneauti* in the sides of the throat being yellow instead of pure white; however, for the present, I do not consider this difference sufficient to make another species of it.

Subfamily PHILYDORINÆ.

167. *PHILYDOR RUFO-BRUNNEUS*, Lawr.

One specimen, from Navarro, May.

168. *ANABAZENOPS VARIEGATICEPS*, Sclat.

Several specimens, from Candelaria, April, May.

Subfamily DENDROCOLAPTINÆ.

169. MARGARORNIS RUBIGINOSA, Lawr.

Two specimens, from Navarro, May.

170. GLYPHORHYNCHUS CUNEATUS, Licht.

One specimen, from Naranjo, April. Killed in the forest on the trunk of a tree. This bird is constantly flying from one tree to another. It is one of those which travel in company with many other species.

171. DENDROCOLAPTES SANCTI-THOMÆ, Lafr.

One specimen, from Navarro, April.

172. DENDROCOLAPTES PUNCTICOLLIS, Sclat. and Salv.

Two specimens, ♂ and ♀, from Naranjo, April. I killed the two on the same tree. They were busily engaged in building their nest in a hole of the trunk.

173. DENDROORNIS SUSURRANS, Jard.

One specimen, from San Carlos, February.

174. PICOLAPTES COMPRESSUS, Cab.

Two specimens, from Navarro, May.

175. XIPHORHYNCHUS PUSILLUS, Sclat.

One specimen, from Naranjo, April. This species seems to be rare. My specimen was killed on the trunk of a tree when going up and down on the same.

Family FORMICARIIDÆ.

Subfamily THAMNOPHILINÆ.

176. THAMNOPHILUS NIGRICRISTATUS, Lawr.

Thamnophilus punctatus, Cab.

One specimen, from San Carlos, February. Rare. All the species of this genus go about in the forest in company with many other birds.

177. THAMNOPHILUS NÆVIUS, Gm.

Two specimens, from San Carlos, February.

178. THAMNOPHILUS DOLIATUS, L.

One specimen, from San Mateo, May.

179. DYSITHAMNUS STRIATICEPS, Lawr.

One specimen, from San Carlos, February. A very rare species.

180. DYSITHAMNUS SEMICINEREUS, Sclat.

Several specimens, Naranjo, April.

Subfamily FORMICIVORINÆ.

181. MYRMOTHERULA MELÆNA, Sclat.

Only one specimen of this fine species. It seems to be very rare. I killed it in the forest perched near the ground. It formed part of a large flock of birds which was not a single moment at rest. As I said before, it is a very common occurrence to see large quantities of ants where these birds are. I have always observed that the Tanageridæ (genus *Buarremon*), Turdidæ (several genera) and Dendrocolaptidæ (all the genera) and a few others keep to the ground, feeding on ants and other insects. At the same time birds of other genera, as *Tanagra*, *Calliste*, *Pipra*, and of many genera of Tyrannidæ, Cœrebidæ, and Ampelidæ, are perched on the trees above, some of them feeding on fruit, others on insects. All of them are constantly flying about all the time.

But the most interesting fact is that every species follows the same route. They travel rather fast; and it has always been an object of admiration to me to see how far they could travel in one day, taking their food at the same time.

I was in the habit of searching for one of these flocks. Once found, it was only a matter for me of selecting what species I wanted; but you must follow the same route as they, and occasionally you may lose yourself in the forest. These remarks apply to species found in the tropical forests from the level of the sea to the altitude of 4000 feet. But I have also observed the same thing with the species which inhabit higher altitudes, whether they live in the forests or on the plains.

182. MYRMOTHERULA MENETRIESI, d'Orb.

One specimen, from Naranjo, April.

183. FORMICIVORA BOUCARDI, Sclat.

San Carlos, February.

Rather rare.

184. RAMPHOCÆNUS SEMITORQUATUS, Lawr.

One specimen, from San Carlos, February. Very rare. Perch on small trees in the forest. It was with the flock spoken of above.

185. CERCOMACRA TYRANNINA, Sclat.

San Carlos, February.

186. MYRMECIZA IMMACULATA, Sclat. and Salv.

Several specimens, from San Carlos, February, and San Mateo, May. Rare.

This species is found on both sides of the country—I mean, in the tropical forests of the Atlantic and Pacific plains. It is therefore very probable that tropical species travel from one sea to the other where they have the facility to do so, without the necessity of passing to a higher altitude; and this is the case in Costa Rica. In a certain part of the country you can pass from one sea to the other without leaving the tropical forests.

Subfamily FORMICARIINÆ.

187. PITHYS BICOLOR, Lawr.

One specimen, from San Carlos, February.

188. FORMICARIUS HOFFMANNI, Cab.

One specimen, from San Carlos, February, killed in the forest, on the ground. This bird is constantly going about, and has a peculiar way of raising and lowering its tail when running along, with which I was very much amused. I saw several other specimens always on the ground. The same thing occurs with the birds of the genus *Siurus*.

189. GRALLARIA PERSPICILLATA, Lawr.

One specimen, from San Carlos, February. Very rare.

Family TYRANNIDÆ.

190. SAYORNIS AQUATICA, Sclat. & Salv.

Several specimens, from San José, January, March. This bird has the curious habit of staying all day long on the stones or bushes growing in or near the streams. It will always be seen at the same place for hours and days one after another. It lives on all the insects flying about over the stream. They are always seen in pairs, ♂ and ♀. Another pair may occasionally be seen at a short distance.

Subfamily PLATYRHYNCHINÆ.

191. PLATYRHYNCHUS ALBIGULARIS, Sclat.

One specimen, from Navarro, May.

192. TODIROSTRUM CINEREUM, L.

Several specimens, from Cartago and San José. Rather rare.

193. EUSCARTHMUS SQUAMICRISTATUS, Lafr.

Two specimens, from Naranjo, April. A rare species and difficult to detect. Goes about in the forest on the small trees.

194. SERPOPHAGA CINEREA, Strickl.

From Naranjo, April. Excessively rare and remarkable for its habits. It has exactly the same mode of life as *Sayornis aquatica*, living along the streams and sitting on the stones lying in or near the water.

First I killed the ♀, in the morning, and for hours could not get a shot at the ♂, and went away. In the afternoon I went again to the same place, and after a little while managed to kill the ♂ bird. The two sexes are exactly alike.

My specimens differing from the Columbian bird, which I have under the name of *S. cinerea*, I give a description of them:—

Forehead and cheeks quite black, with the inner webs of the central feathers white, back and upper coverts of the tail ashy grey;

throat, breast, and abdomen of the same colour, but much paler, nearly white on the throat; primaries and secondaries black, tertiaries black with white ends or fringes; upperside of the tail black, underside dark grey, nearly black; under wing-coverts of the same colour as the abdomen; bill and toes black.

Length 4 inches, wings $2\frac{1}{8}$, tail $1\frac{5}{8}$. The two sexes are exactly alike. Closely allied to *S. cinerea*, but a much smaller bird altogether; besides, the colour of the back has not the olive tint conspicuous in *S. cinerea*.

Subfamily ELAINEINÆ.

195. MIONECTES OLEAGINUS, Cab.

One specimen, from San Mateo, May.

196. TYRANNISCUS PARVUS, Lawr.

One specimen, from Navarro, May.

197. ELAINEA PAGANA, Licht.

Elainea subpagana, Sclat. & Salv.

Several specimens, from San José, January to May. On the edges of the coffee-plantations.

198. ELAINEA FRANTZII, Lawr.

One specimen, from the Volcano of Irazu, March.

199. LEGATUS ALBICOLLIS, Vieill.

Several specimens, from Naranjo, April, all of them killed on a large tree standing by itself in a "potrero" near the habitations.

200. MYIOZETETES TEXENSIS, Giraud.

Two specimens, from San José, March, and Naranjo, April. Common.

201. RHYNCHOCYCLUS SULPHURESCENS, Spix.

Only one specimen, from San Carlos, February.

202. MYIODYNASTES LUTEIVENTRIS, Sclat.

Two specimens, from Orozi, May.

Subfamily TYRANNINÆ.

203. MEGARHYNCHUS PITANGUA, L.

Native name "Chorchita."

One specimen, from San José, March. Not common here.

204. MUSCIVORA MEXICANA, Sclat.

Native name "Rey de los Traga moscas."

Two specimens, male and female, from San Ramon. Lives in the forest only. When in love it shows its beautiful crest with much effect.

205. *MYIOBIUS SULPHUREIPYGIUS*, Sclat.

Two specimens, from Naranjo, April.

206. *MYIOBIUS ERYTHRURUS*, Cab.

One specimen, from San Carlos, February.

This seems to be a rare species. I wanted more specimens, and could only succeed in seeing another, which I could not shoot.

207. *MITREPHORUS AURANTIIVENTRIS*, Lawr.

Several specimens, from La Laguna, February Naranjo, April, and Candelaria, May. I killed these in the forest at the altitude of 4000 to 8000 feet. They used to stay at the same place for a long time; they select a branch, and you see them there all day long. All the time they fly about catching insects, and returning to the same spot. I missed one of my specimens twice; notwithstanding, it came back to its favourite branch. There is no appreciable difference between the two sexes. I have also one specimen with the abdomen of the same colour as the throat and the breast; otherwise there is no appreciable difference. It was obtained at San Mateo, altitude 1000 feet.

208. *EMPIDONAX FLAVESCENS*, Lawr.

Several specimens, from Naranjo, April.

209. *CONTOPUS VIRENS*, L.

Several specimens, from Cartago, April.

210. *MYIARCHUS CRINITUS*, L.

Native name "Traga mosca."

Several specimens, from San José, January, and Cartago, April. Rather rare in Costa Rica. They used to perch on a selected branch of the trees edging the coffee-plantations, and remained there all day long catching the insects passing by.

211. *MYIARCHUS PANAMENSIS*, Lawr.

Three specimens, from Punta Arenas, May. Killed on the mangrove-trees near the river.

212. *MYIARCHUS LAWRENCEI*, Giraud.

Myiarchus nigricapillus, Cab.

Many specimens, from San José, Cartago, and Naranjo, January to May.

Native name "Tonto vivo."

213. *MYIARCHUS CINERASCENS*, Lawr.

Two specimens, from Punta Arenas, May. Killed at the end of the sandy point near the town.

214. *TYRANNUS MELANCHOLICUS*, Vieill.

Many specimens, from San José, January to May. Common everywhere, especially on the trees surrounding the coffee-plantations.

215. *MILVULUS FORFICATUS*, Gm.

Native name "Tijerillo."

Several specimens from San José, January to May. Very common in the Savana, a beautiful plain about one mile and a half from the town. They are usually perched on the small shrubs in the plain.

Family COTINGIDÆ.

216. *TITYRA PERSONATA*, Jard. & Selby.

Several specimens from Orozi. Always seen perched on the highest trees, where they remain sometimes for hours, as if they were on the watch. They are easily mistaken for *Carpodectes nitidus*, which they resemble very much when seen at a long distance.

217. *PACHYRHAMPHUS VERSICOLOR*, Hartl.

Only one specimen, from Candelaria, May. Very rare.

218. *PACHYRHAMPHUS CINEREIVENTRIS*, Sclat.

One specimen, from San Mateo, May.

219. *LIPAUGUS HOLERYTHRUS*, Sclat. & Salv.

Several specimens from San Carlos, February; and Naranjo, April.

220. *CARPODECTES NITIDUS*, Salv.

One adult female, from San Carlos, February. This sex, being quite new to science, I give a description of it.

Head and back of a dark bluish grey, rather lighter on the forehead; the upper feathers of the tail nearly black, the underside ashy grey; wing-coverts of the same colour as the back; primaries black; the secondaries and tertiaries have a white border on their inner webs; cheeks, throat, and round the eyes white; breast and abdomen pale bluish grey; under wing- and under tail-coverts white; the lower part of the abdomen white; thighs white; toes black; bill blue.

Total length $8\frac{2}{8}$ inches, wing $5\frac{2}{8}$, tail $2\frac{6}{8}$.

I procured this bird quite accidentally. During our stay at San Carlos we used to bathe every afternoon in a stream close by the rancho, and I always carried my gun with me. The third day after our arrival at San Carlos we were quietly enjoying our bath when my friend Meil saw this bird alighting on a tree close by. Immediately he told me I came out of the water and took my gun; but the bird was perched so high that I could not make out with certainty what species it was. I was struck by its colour, and I thought immediately of *Carpodectes*, of which I had seen a figure in the 'Proceedings.' I had a shot at the bird; and it fell down, but far away in the forest amongst Agave plants growing near the stream. My friends saw the direction where it fell; and although I was quite naked, I went into the forest, and, after twenty minutes of the most active search, I had the pleasure of finding it quite dead. Several times I was near giving up the search; but now I feel very happy

that I did not do so, as I consider this bird one of the most valuable additions to my collection.

Every day after that I went to the same place and in the neighbourhood to look for more; but I was disappointed, until the day before my departure, when I saw what I think was the mate of my female; but, to my great annoyance, I could not get a shot at it. It sat for more than two hours, without moving, at the top of a tree more than one hundred feet high, where I could not kill it. It kept me until nightfall with my head lifted up in such a manner that I had a stiff neck when I left. I think it is the greatest punishment for a naturalist to be looking at a very rare bird above his head for several hours without being able to get a shot at it.

When I went away I recommended the people living in the rancho to kill some specimens for me. I offered them a high price; but all for nothing: they said they never saw another. If it was not neglect of theirs, this must be a very rare bird indeed.

221. *CHASMORHYNCHUS TRICARUNCULATUS*, Verr.

One specimen from the Volcano of Irazu, January. This seems to be a rare species. My specimen was killed at the altitude of 6000 feet.

222. *CEPHALOPTERUS GLABRICOLLIS*, Gould.

San Carlos, February; Volcano of Irazu, May. This singular bird is found at all altitudes up to 10,000 feet in the forests. Were it not for its cries it would be excessively difficult to detect, as it always keeps in the densest parts. Its cry is something extraordinary. When I heard it first I thought it was a new species of *Crax* or some other similar large bird. Being very anxious to see what it was, I went into the forest; and after a great deal of trouble I found it. They perch rather high, but are easily killed when once found.

Family *PIPRIDÆ*.

223. *PIPRA MENTALIS*, Sclat.

One specimen from San Carlos, February. Perches usually low, and keeps in the forest.

224. *PIPRA LEUCORRHOA*, Sclat.

Cervantes, Naranjo.

225. *CHIROXIPHIA LINEARIS*, Bp.

Several specimens, from Navarro, May.

226. *CHIROMACHÆRIS CANDÆI*, Parz.

One specimen, from San Carlos, February. Perches on the small trees in the forest; and the male has the particular habit, as have some other species of *Pipridæ*, of making a great sound when flying from one branch to another. It imitates exactly the sound produced by the children's toy rattle. I think this noise is produced by its

beak. It resembles the sound of mandibles opening and shutting with noise several times in succession.

Ordo MACROCHIRES.

Family CAPRIMULGIDÆ.

227. NYCTIDROMUS ALBICOLLIS, Gm.

Two specimens, male and female, from Cartago. They were in a small forest, on the ground. They usually fly away as you get quite close to them, and settle again a little further on.

Family HIRUNDINIDÆ.

228. ATTICORA CYANOLEUCA, Vieill., var. MONTANA, Baird.

Several specimens from San José, March; Cartago, April. During these months they are building their nests in the roofs of the houses. They appear in February, and leave when the rainy season comes.

229. STELGIDOPTERYX FULVIPENNIS, Sclat.

Stelgidopteryx fulvigula, Baird.

Several specimens, from San José, March to May. They are principally seen flying near the streams, sometimes in large quantities. The first time I had a shot at them I killed six; there were about fifty on a small tree. Although I have killed a good many, I never found a female amongst them. I suppose the females must have been in their nests somewhere; but where, I was never able to find out.

Family CYPSELIDÆ.

230. HEMIPROCNE ZONARIS, Shaw(?).

In one of my excursions, at the Volcano of Irazu I saw a large quantity of birds which, I think, must have been this species. I am certain about the genus; but not having been able to get a specimen, I leave the question of species for the future.

Ordo TROCHILI.

231. PHAËTHORNIS LONGIROSTRIS, Delattre.

Naranjo, April. This bird is always seen in the denser part of the forest. One of the favourite flowers on which it feeds is that of the plane-tree.

232. PHAËTHORNIS EMILIÆ, Bourc.

Several specimens from Tres Rios, January; Naranjo, April.

233. PYGMORNIS ADOLPHI, Gould.

San Carlos, February. This is a very common species—but very difficult to detect, as it only comes out of the forest early in the morning and late in the afternoon. In the middle of the day they are very abundant in certain parts of the forest, many specimens being seen at a few yards from one another. They are perched on small dry

branches near the ground. In the pairing-season they sing all day long; the note sounds like "bebe, bebe," repeated a great many times in succession. Although it cannot be heard at a long distance, it is perfectly amazing and amusing to hear them. As soon as one finishes, another commences; and it is a puzzle to find where they are, although they may be only at two or three yards distance, on account of their colour and their diminutive size. When singing they move their head and tail in the most pretty way. Now and then they fly about, but soon return to their favourite branch. I have usually heard the song of these birds in the breeding-season, the males singing while the females are on their nests.

When in Mexico I have heard many species of Humming-birds sing, and I could distinguish by its song what species it was. Their songs are very pretty, and quite distinct from one another, especially when they are of birds of distinct genera. I have heard *Pygmornis adolphi*, *Campylopterus hemileucurus*, *Sphenoproctus curvipennis*, *Eugenes fulgens*, *Cœligena clemenciæ*, *Lamprolæma rhami*, *Delattria henrici*, *Petasophora thalassina*, and several other species sing.

234. CAMPYLOPTERUS HEMILEUCURUS, Licht.

Several specimens from Tres Rios, January; and Rancho redondo, May. Rather rare in Costa Rica. Inhabits the forests; but takes its food as well on the flowers of trees growing close by in the open spaces. My specimens were obtained when sucking the flowers of an acacia tree which is found abundantly in the coffee-plantations. It has a special sharp cry when flying about. It commonly constructs its nest in the barrancas, on the plants growing between the rocks, and generally uses moss for its construction.

235. EUGENES SPECTABILIS, Lawr.

One male and one female of this very rare species, from the Volcano of Irazu, April and May. Altitude from 6000 to 8000 feet. It is very fond of a parasitic plant something like mistletoe, which bears a beautiful red flower. No description having been published of the male of this species, I give it now.

Forehead dark metallic blue; back black; rump metallic green; tail bronzy black, with the two central feathers more greenish; wings black, with the upper coverts metallic green; throat metallic dark green; breast and abdomen greyish, mixed with green feathers; feet and beak black.

Length $5\frac{2}{3}$ inches, wing $3\frac{2}{3}$, tail $1\frac{6}{8}$, beak $1\frac{1}{8}$. (Mus. Boucard.)

The chief distinctions between this species and *Eugenes fulgens* are in its much larger size, its longer beak, its grey breast and abdomen, its back entirely black, and the colour of the crown and throat, which are quite of a different green and blue.

236. OREOPYRA CINEREICAUDA, Lawr.

One specimen of this rare species, from Navarro, May. Inhabits the forest.

237. *OREOPYRA CALOLEMA*, Salv.

Many specimens of both sexes from Naranjo, April; Navarro and Rancho redondo, May. I have not the least doubt that the bird described as *Anthocephala castaneiventris*, Gould, is the female of this species. These birds are only met with in the forest.

238. *OREOPYRA HEMILEUCA*, Salv.

Two specimens, from Naranjo, April. It seems to be a very rare species.

239. *PETASOPHORA CYANOTIS*, Bourc.

Petasophora cabanisi, Lawr.

Several specimens from the Volcano of Irazu, April. Rather common at the altitude of 8000 feet, feeding on the flowers of a small shrub. They take possession of a certain space containing several of these shrubs; and when not feeding on these flowers, they perch on a dry branch near the place, and fight all the other Humming-birds that dare to intrude.

240. *HELIODOXA JACULA*, Gould.

Heliodoxa henryi, Lawr.

Several specimens from Naranjo, April; Volcano of Irazu, May. One male, although it is not in very fine plumage, has a bright front, and the throat exactly like the specimens from Columbia. Rather rare in Costa Rica.

241. *HELIOMASTER CONSTANTI*, Delattre.

Only one young male, from San José, January; killed while he was sucking the flower of an acacia tree.

242. *THALURANIA COLOMBICA*, Bourc. & Muls., var. *VENUSTA*, Gould.

Several specimens from San Carlos, February; and Naranjo, April. It perches on very high trees in the forests, and is difficult to get at. It is a rare species in Costa Rica.

I spent many hours before I could get the pair which I have, from San Carlos. I could not recognize the bird, because it was standing and feeding on the flowers of a parasitic plant very high on a large cedar tree. I thought it was a new species of *Microchera*, so small was its appearance. When I killed the first I was quite disappointed, and was sorry to have lost so much time for it.

243. *KLAIS GUIMETI*, Bourc. & Muls.

Klais merriti, Lawr.

Only two specimens, from Navarro, May: a very rare species.

244. *MICROCHERA PARVIROSTRIS*, Lawr.

Only one specimen of a young male, given to me by Mr. Juan Zeledon. Excessively rare. Although I knew the exact locality where found, I could never find one.

245. PAPHIOSA HELENÆ, Del.

I saw several male specimens of this species at San Carlos; but I was never able to get a shot at them. I have one female specimen from Turrialba.

246. DORYCHA BRYANTÆ, Lawt.

San José, March; Volcano of Irazu, April. A very rare species. It appears as soon as it is daylight, and is very quick. It never rests long in one place. When on the wing it makes a great noise, similar to that of a large Coleopteron (Scarabeidæ) when flying.

247. TROCHILUS COLUBRIS, Linn.

One specimen, from San José, January. Seems to be very rare in Costa Rica.

248. SELASPHORUS SCINTILLA, Gould.

Several specimens from Cartago, April; and Volcano of Irazu, May. Seen also at the high altitude of 10,000 feet in company with *Selasphorus flammula*. Feeds on the flowers of small plants. When I say feeds on the flowers, I mean that it takes from the flowers not only the honey, but, above all, the minute insects which are inside. This is usual with all the Humming-birds. I have no doubt that they can live a certain time on honey only; but it is not sufficient, and their principal food is insects. It is very seldom that you skin a Humming-bird without finding the crop filled partially with insects of all descriptions. I have brought home a certain number of crops in alcohol. All of them contain insects, which I intend to determine as soon as possible. *S. scintilla* makes a very slight noise when flying; it is not more than that of a drone-bee.

The place where I killed my specimens had been taken possession of by a certain number of *Sancerottia sophiæ* and *Pyrrhophæna riefferi*. Each one of these had its assigned place, and used to drive away any trespasser. I noticed that *S. scintilla* used to go only to the small plants near the ground; and I have no doubt that the little noise made by the bird was to escape its enemies *S. sophiæ* and *P. riefferi*. Flying very low was another precaution; however, the sight and the hearing of these little birds is so subtle that poor *S. scintilla* was soon detected and obliged to fly away. I think this also is the reason why this species was rather scarce.

249. SELASPHORUS FLAMMULA, Salv.

Several specimens, male and female, of this very rare species. All of them were killed at the summit of the Volcano of Irazu, on parasitic plants (mistletoe) growing on small alpine trees in a soil composed principally of ashes and scorïæ. There, at the altitude of 10,000 feet and more, it takes possession of a locality where flowers are abundant, and defends its property against *S. scintilla* and other birds.

250. *THAUMATIAS CUPREICEPS*, Lawr.

One specimen, from Naranjo, April, killed in the forest. I have also several other specimens of this species sufficiently good for skeletons.

251. *EUPHERUSA EGREGIA*, Sclat. & Salv.

One specimen, from Navarro, May.

252. *AMAZILIA CINNAMOMEA*, Less.

Several specimens, from San Mateo and Puntarenas, May. This species seems to be found only on the Pacific coast. I have some specimens from Tehuantepec; and I remember having seen this species near Juquila (Mexico). The male and female are exactly alike. They are fond of the flowers of orange-trees.

253. *PYRRHOPHÆNA RIEFFERI*, Bourc.

Several specimens, from San José and Cartago, January to May. Very common species, and quite domestic in its habits. Quantities of them may be seen in private gardens.

254. *SAUCEROTTIA SOPHIÆ*, Bourc.

Several specimens, from San José and Cartago, January to May. They are constantly fighting with *P. riefferi*; but this species is seldom seen in the gardens of San José.

255. *PANTERPE INSIGNIS*, Cab. & Heine.

Several specimens of this fine species, from the Volcano of Irazu, April and May. I never saw this bird anywhere else. It is very rare. It feeds on the mistletoe growing on the robble (oak tree).

The female is a little smaller than the male; but otherwise they are exactly alike. This is one of the few species in which the female is a bright-coloured bird, nearly as fine as the male. I have several females, and I am quite sure about the sex.

256. *DAMOPHILA AMABILIS*, Gould.

Several specimens, from San Carlos, February. A very rare species; found only in the forest.

257. *SAPPHIRONIA BOUCARDI*.

Arinia boucardi, Muls., Ann. Soc. Linn. de Lyon, 12 Oct. 1877.

Several specimens, from Puntarenas, May. Male and female. Mus. Boucard.

258. *CHLOROLAMPIS CANIVETI*, Less.

Chlorolampis salvini, Cab.

Several specimens, from San José and Cartago, January to May. Commonly found in the gardens, where it makes its nest.

3. Descriptions of seven new Species of Land-Shells recently collected in Costa Rica by Mr. Adolphe Boucard. By GEORGE FRENCH ANGAS, C.M.Z.S., F.L.S., &c.

[Received November 17, 1877.]

(Plate V.)

HELIX BOUCARDI, n. s. (Plate V. figs. 5, 6, 7.)

Shell narrowly and profoundly umbilicated, depressedly conical, moderately thin, very finely radiately striated, white, the upper surface ornamented with two fawn-coloured bands passing into chocolate towards the apical whorls, or entirely fawn-colour, with a narrow effuse chocolate band next to the periphery; whorls $4\frac{1}{2}$, somewhat convex, strongly bluntly keeled at the periphery, with an impressed groove below the keel; apex obtuse, tinged with violet; sutures impressed, bordered with a narrow chestnut line; base convex, white; umbilicus dark brown; umbilical region tinged with lemon-yellow; aperture very oblique, narrowly quadrately ovate, pale violet within; outer lip a little expanded and reflexed, slightly sinuate and projected above, arcuate below.

Diam. maj. 13 lines, min. 10, alt. 7.

Hab. Navarro, Costa Rica; on leaves of trees. (*Mus.* Boucard.)

HELIX ADELA, n. s. (Plate V. figs. 8, 9, 10.)

Shell umbilicated, discoidal, flattened, very finely radiately striated, pale straw-colour, ornamented with a single narrow black band just above the periphery of the last whorl; whorls $3\frac{1}{2}$, somewhat convex; spire very much depressed; base flatly convex, with an excavated area around the umbilicus which is shallow and non-perspective; aperture horizontal, narrowly oblongly ovate; outer lip slightly expanded and reflexed.

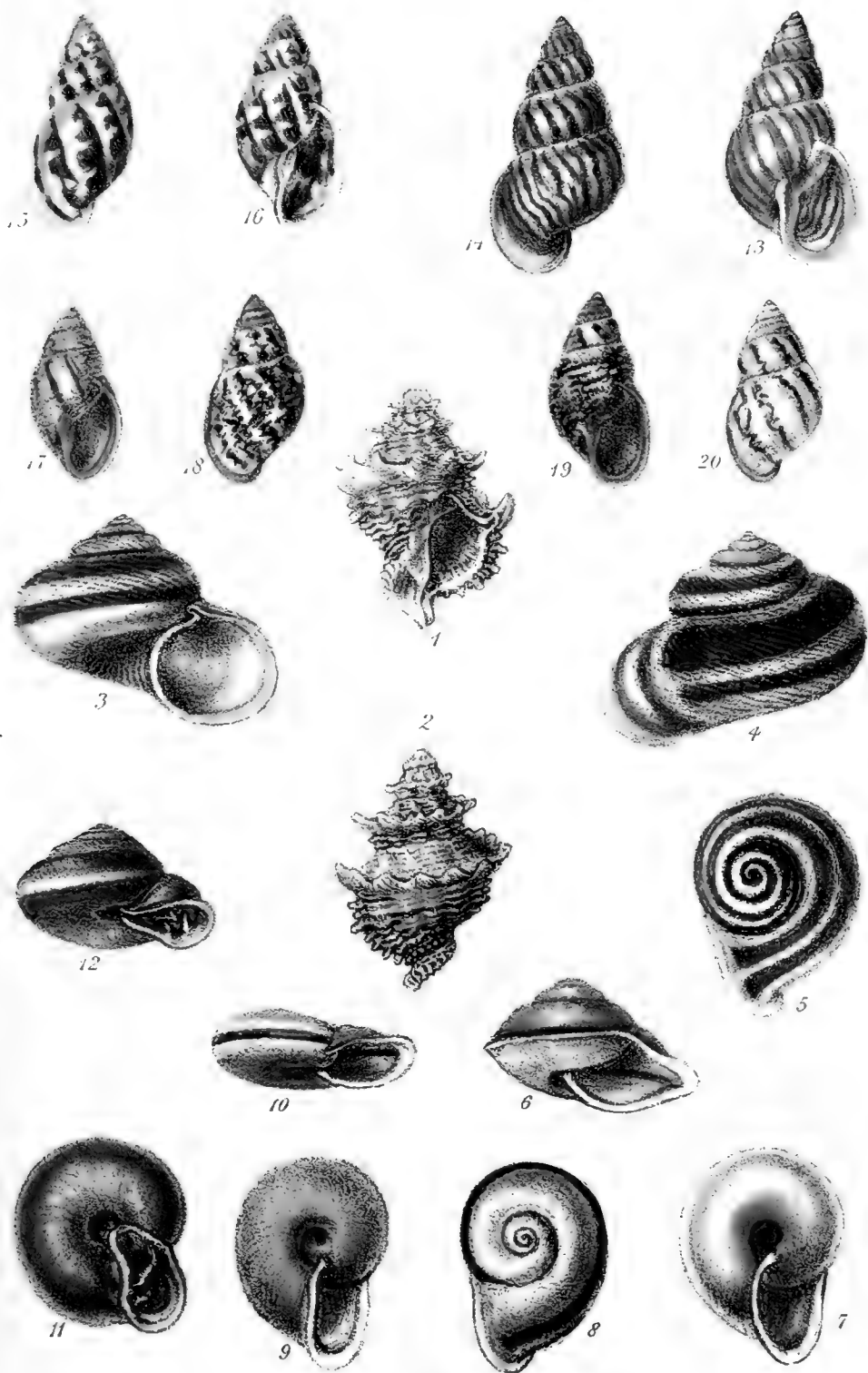
Diam. maj. 12 lines, min. 9, alt. 4.

Hab. Navarro, Costa Rica, on trees. (*Mus.* Boucard.)

HELIX ÆSOPUS, n. s. (Plate V. figs. 11, 12.)

Shell umbilicated, depressedly conoidal, moderately solid, very finely obliquely striated and finely granulated, the granules being denser on the last whorl and obsolete towards the apex, brown, with a pale suffused band at the periphery of the last whorl; whorls 5, somewhat convex, the last bluntly keeled, contracted and deflected behind the outer lip; apex obtuse; base rather flattened; aperture horizontal, ear-shaped, brown, with a prominent, erect, slightly undulating, lamelliform, transverse ridge within upon the wall of the body-whorl; peristome white, somewhat thickened and reflexed, with a short blunt tooth at the base of the columella and a longer compressed triangular one incurved within the aperture opposite the ridge on the body-whorl; margins united by an erect lamella.

Diam. maj. 12 lines, min. 10, alt. 6.





Hab. Buena Vista, Costa Rica, at an altitude of 3000 feet.

(*Mus.* Boucard.)

This shell belongs to a group of *Helices* remarkable for their curiously toothed apertures, having as its nearest allies *H. quadridentata*, Brod., and *H. auriculina*, Petit.

CYCLOTUS BOUCARDI, n. s. (Plate V. figs. 3, 4.)

Shell widely and perspectively umbilicated, globosely turbinate, white, with a broad olive-chestnut band above and a narrower one just below the periphery, very finely longitudinally striated and crossed with rows of rugged irregular undulating oblique malleated ridges; whorls 6, convex, rapidly increasing, the last large and rounded; aperture nearly circular, white within; peritreme simple, scarcely thickened, with a semilunar notch at the junction of the body-whorl.

Diam. maj. 16 lines, min. 13, alt. 12.

Hab. San Carlos, Costa Rica.

A fine species with an excavated notch where the peritreme touches the body-whorl, as in *Cyclotus mexicanus*, Menke, from Vera Cruz.

(*Mus.* Boucard.)

BULIMUS JOSEPHUS, n. s. (Plate V. figs. 13, 14.)

Shell perforate, elongately ovate, moderately solid, very finely obliquely striated, whitish, ornamented with somewhat distant irregular slightly undulating narrow olive-brown stripes, which become obsolete near the umbilical region; spire elevately conical; sutures impressed; apex brownish yellow; whorls $6\frac{1}{2}$, flatly convex; aperture ovate; somewhat effuse below; outer lip expanded and flattened; columella triangular and flattened inwards, ending in a blunt rounded callus internally.

Diam. 7 lines, alt. 16.

Hab. San José, Costa Rica, on the trunks of acacia trees.

(*Mus.* Boucard.)

BULIMUS IRAZUENSIS, n. s. (Plate V. figs. 17-20.)

Shell somewhat elongately ovate, rimate, moderately thin, longitudinally irregularly striated, shining, more or less longitudinally striped or freckled with black, and ornamented with numerous small white spots; whorls 6, rather convex; spire a little shorter than the aperture; aperture oblong-ovate; lip thin, simple, tinged inside with rose-colour.

Diam. 6 lines, alt. 12.

Hab. Volcano of Irazu, Costa Rica, on low aromatic bushes on the eastern slope of the volcano.

A variety of this pretty species occurs in which the prevailing colour is light brown, profusely sprinkled with little white spots.

(*Mus.* Boucard.)

BULIMUS NAVARRENSIS, n. s. (Plate V. figs. 15, 16.)

Shell narrowly rimate, more or less elongately ovate, thin, irre-

gularly longitudinally striated, shining, whitish, tinged with pale straw-colour towards the base, variously painted with irregular more or less undulating longitudinal greyish black stripes or quadrilateral blotches, frequently taking the form of a confused band towards the centre of the whorl; spire conical, shorter than the aperture; apex acute; whorls $5\frac{1}{2}$, rather convex, the last somewhat inflated; aperture elongately ovate; peristome simple, thin; outer lip slightly expanded outwards.

Diam. 6 lines, alt. 12.

Hab. Navarro, Costa Rica; a somewhat smaller and more inflated variety was obtained by Mr. Boucard at Cartago.

This species somewhat resembles *B. iodostylus* of Pfeiffer; but it is generally more inflated, with the outer lip expanded, and wants the violet colouring on the columella characteristic of the latter.

Abundant on acacia trees.

(*Mus.* Boucard.)

EXPLANATION OF PLATE V.

Figs. 1, 2. *Latiaxis elegans*, p. 74.
3, 4. *Cyclotus boucardi*, p. 73.
5-7. *Helix boucardi*, p. 72.
8-10. — *adela*, p. 72.

Figs. 11, 12. *Helix æsopus*, p. 72.
13, 14. *Bulimus josephus*, p. 73.
15, 16. — *navarrensis*, p. 73.
17-20. — *irazuensis*, p. 73.

4. Description of a new Species of *Latiaxis*. By GEORGE FRENCH ANGAS, C.M.Z.S., F.L.S., &c.

[Received November 17, 1877.]

(Plate V.)

LATIAXIS ELEGANS, n. s. (Plate V. figs. 1, 2.)

Shell rimate, ovately turreted, solid, white; length of spire and aperture equal; whorls $5\frac{1}{2}$, irregularly distantly longitudinally ribbed, flattened and excavated above, with a wide projecting keel, curving upwards and scalloped at the edge, running round the periphery of the whorls, which are encircled by scabrous ridges, fine and close-set above the keel, stouter, wider apart, and more squamate below, one ridge (intermediate between the keel of the body-whorl and the base) being larger and more elevated than the others; aperture semi-oval; outer lip sulcate within; columella nearly straight; umbilical region bordered by an elevated squamose ridge; canal very short, slightly twisted and recurved.

Diam. 11 lines, alt. 1 in. 2 lines.

Hab. Unknown.

This beautiful species of *Latiaxis* has been placed in my hands for description by Mr. Robert Geale.

5. Notes on *Conurus hilaris* and other Parrots of the Argentine Republic. By Dr. H. BURMEISTER, F.M.Z.S.

[Received November 19, 1877.]

During my residence at Tucuman, in the years 1859-60, I saw several flights of six or eight of a long-tailed parrot, of which I was not able to obtain a specimen, although the birds came every week during the maturing-time of the Indian corn to the garden of the house in which I lived, and did much damage to the seeds of the plants cultivated there. This bird, while it had the same habit of plundering the gardens as the other Parrots inhabiting this country (for example *Conurus patagonus* and *C. murinus*), was also, like its fellows, very cautious, some of them keeping watch on the top of the highest plants, and, as soon as any one appeared with gun in hand, giving a quick cry of alarm, upon which the whole flock flew away. On this account I was unable to obtain a single specimen of this beautiful bird, which I have not seen in any other part of this country, and which I recognized at once, even at a distance, as new to my collection, from its large red front. At last I found a living specimen in the possession of a shop-keeper, who would not part with it, having reared it from the nest and made a great favourite of it. But I was able to observe more carefully the specific distinctness of this bird than from a distance; and from this examination I made the description published in my 'Reise durch die La Plata-Staaten,' vol. ii. p. 442, as follows:—

Size and colour of *Conurus murinus*; whole plumage bright green, only the forehead at the base of the bill blood-red. Bill, in life, pale rose-colour, or quite white in old individuals. Carpal region green; the wing-feathers blackish, becoming bluer towards the margins. Tail narrow and cuneiform, greenish towards the margins, red at the base and below. Legs light flesh-colour. Iris orange. Whole length 10 inches, wing 5, tail $4\frac{1}{2}$.

This short description, the only one I was able to give at the time, was not sufficient to make the species thoroughly known. I therefore wrote to my friends at Tucuman, as soon as I returned to Buenos Aires in the year 1862, to send me specimens of this interesting Parrot; but all my solicitations, though repeated many times, were without effect. I never obtained a single specimen, although the bird is not rare in the vicinity of the large forests on the western sides of the town, near the slopes of the mountains, and sometimes very common.

At last my friend Dr. Bruland, physician at Tucuman, an excellent collector who had forwarded me many interesting objects for my collection, brought me two well-preserved skins; and some months before, Mr. Holmberg, of Buenos Aires, who made a journey to collect zoological objects in the northern provinces, brought home from Salta a skin of the same species, which I was able to compare with the other two now in the Public Museum of Buenos Aires.

These three skins enable me to give the following full description.

Beginning with the size, I find that the living specimen I examined must have been very young, and by no means fully adult, as the three skins now under my inspection are all larger. The two largest measure from the front to the tip of the tail 13 inches, and the smaller specimen (from Salta) 12 inches, tail $6\frac{1}{2}$ inches, and the wings $7\frac{1}{2}$ – $7\frac{3}{4}$.

The predominating colour is pure green, somewhat darker on the upperside, more especially on the head and neck, but clearer on the underside; the wing- and tail-feathers are of the same colour outside, both with black shafts, and the former with a blackish interior margin inclining to blue. The inside of these above-mentioned feathers is yellowish grey, darker on the margins, and the yellow colour clearer on the tail-feathers towards the base, which in some specimens are of an orange appearance.

There is no red on these feathers in any of the three specimens; but it is possible that when alive it may have had this colour, if not very distinct, at least visible. I find in one of these specimens a red spot on two of the tail-coverts, which are generally completely green.

The red colour is regular only on the front of the head, beginning from the base of the upper mandible, extending up to and behind the eye; but a small space of green appears over the middle of the eye, and descends on the cheeks to the ear and the under mandible, with some green feathers near the angle of the mouth.

At first these red feathers are very small and of a dark red-brown, and thence the others become blood-red. Besides this regular frontal patch there are other red feathers on other parts of the body, but without any constant regularity in different specimens of the same species. I find in my three examples great difference in the distribution of these red feathers.

There generally seem to exist some red feathers on the neck, front of the throat, and breast; also there is always a circle of red feathers at the end of the tibia.

As to the habits and manner of living of this bird, I cannot add any thing to what I have already said at the commencement of this communication. It lives only in the northern mountainous districts of the Argentine Republic, never coming to the plains of the Pampas.

I take this occasion to correct some mistakes made by Dr. Finsch in his work, respecting my previous communications on different species of Parrots of this country and of Brazil.

The author says (vol. i. p. 174) that he knows nothing of the spines on the sides of the tongue of the *Aræ*, mentioned by me in my work on the Animals of Brazil. In that work (vol. ii. p. 152) I described the tip of the tongue of this genus as like a stalk in form (*stängelförmig*). But this German word was a mistake of my printers. I wrote "*stämpelförmig*" (shaped like a pestle), comparing the thick fleshy tongue of the *Aræ* (although not entirely

cylindrical) to that instrument, but by no means to that of a stalk of a flower or fruit, to which the tongue has no resemblance.

I have at this very moment under my inspection the tongue of a large *Macrocercus macao* (*Sittace chloroptera*, Gray), which recently died in the house of one of my friends. This tongue has on each side, behind the two fringed lobes, with which the tongue of all parrots terminate, several large spines.

In the tongue of *Bolborhynchus murinus* I find no spines in the same place.

In volume i. of the same work, Dr. Finsch thinks it surprising (*auffallend*) that I have not mentioned that *Conurus nanday* also inhabits the Argentine Republic, although the specimen in Mr. Sclater's collection came from Buenos Aires. This latter fact may be true; but I am still more surprised to find that Dr. Finsch thinks that all specimens coming from Buenos Aires must necessarily have lived in this country. The species alluded to is by no means an inhabitant of the Argentine Republic, but comes only from Paraguay, and is often brought to Buenos Aires alive, as the bird is here considered a great rarity. That it lives also at Bolivia I have never heard here in Buenos Aires, though I have had a living specimen in my room for a long while, which was very tame, and would stand on my shoulder and remain in this position while I took long walks. At last I gave it to a friend of mine who was going to Europe, with the instruction that after its death it was to be put in the collection at Halle.

The description of this bird given by Dr. Finsch is not entirely correct. The head has no blackish brown on the front and vertex, but is entirely black, the brown colour being the consequence of the skin being old and dry.

In vol. ii. part 1, p. 116, of Dr. Finsch's work, the *Bolborhynchus monachus* is named "*calita*." The orthography of this term is erroneous, the bird, which is very common in all parts of the Argentine Republic, being called always *catita*. Again, Dr. Finsch says the two sexes do not differ; but I find the breast of the male of a much clearer grey than that of the female, and that it has very distinct, darker and clearer transverse stripes, while the latter are wanting in the female, which has an obscure grey-coloured breast, with a trace of brown-grey, which is not seen at all in the male.

In the young state both sexes are alike.

In vol. ii. p. 126, Dr. Finsch describes my *Bolborhynchus rubrirostris* from the young specimen sent by myself to the Bremen Museum, and blames me for not mentioning the blue-grey-greenish colour on the throat and breast. But this colour is not persistent, but is only found in the young bird (of the first year). The adult bird is entirely clear green on the breast, the same as on the neck and the whole body. From the young state of the specimen examined by Dr. Finsch results also the discrepancy in the length of the wing, which measures 5 inches in the old bird, and not 3" 10'" as he says.

6. Reports on the Collection of Birds made during the Voyage of H.M.S. 'Challenger.'—No. VI. On the Birds of Ternate, Amboyna, Banda, the Ké Islands, and the Aru Islands. By T. SALVADORI, C.M.Z.S.

[Received November 26, 1877.]

The collection of birds made at the above-mentioned localities is not very large, numbering only 131 specimens, belonging to 79 species. None of these are new to science; but some are of special interest, as having been described quite recently or as being new to the locality where now they have been found.

I propose to treat of them separately, according to the localities.

I. *Birds from Ternate.*

[The ship arrived at Ternate on the evening of the 14th October, 1874, and sailed from Ternate at 11 A.M. on the 17th Oct. 1874.—*J. M.*]

The birds are only 12 in number, and belong to 10 species; a specimen of *Lorius cyanauchen*, although bought alive at Ternate, must have been brought there from a very different and far-away locality.

1. SCOPS MOROTENSIS, Sharpe.

Scops morotensis, Sharpe, Cat. Strig. p. 75, pl. vii. f. 1 (1875), (type examined).

[No. 325. Male: eyes yellow; stomach contained large grasshoppers.—*J. M.*]

One "male" (No. 325) in the dark rufous plumage.

All the specimens from Ternate which I have seen agree better with the form from Morty than with that from Halmahera, *S. leucospilus* (G. R. Gr.).

I know of other instances in which the birds inhabiting the small islands surrounding Halmahera, although very far one from the other, agree better *inter se* than with the form inhabiting the mainland.

2. TANYGNATHUS MEGALORHYNCHUS (Bodd.).

Psittacus megalorhynchus, Bodd. Tabl. Pl. Enl. p. 45 (1783) (ex Buffon, Pl. Enl. 713).

Eclectus megalorhynchus, Schleg.; Finsch, Die Papag. ii. p. 351 (1870).

[No. 337. Male: eyes white; bought alive at Ternate.—*J. M.*]

3. ECLECTUS RORATUS (Müll.).

Psittacus roratus, Müll. S. N. Suppl. p. 77 (1776) (♀); Cass. Pr. Ac. Nat. Sc. Philad. 1864, p. 240. no. 52.

Psittacus grandis, Gm. S. N. i. p. 335. no. 102 (1788) (♀).

Eclectus grandis, Wagl.; Finsch, Die Papag. ii. p. 340 (1868).

Eclectus polychlorus, ex Batchian, Halmahera et Ternate, auctt. (nec Scop.) (♂); Finsch, Die Papag. ii. p. 393 (partim) (1868).

[336. Male: eyes yellow. 361. Female: this is the female of No. 336; it was purchased along with others at Ternate and kept alive on board till the 28th Oct., when it was killed and skinned, as it proved a nuisance while alive.—*J. M.*]

Two specimens bought alive at Ternate, a "male" (No. 336) green and a "female" (No. 361) red; this one is very interesting, having some green feathers among the scapularies.

Both specimens are much smaller than the birds which I have seen from Halmahera.

4. LORIUS DOMICELLA (Linn.).

Psittacus domicella, Linn. S. N. i. p. 145. n. 26 (1766).

Domicella atricapilla, Wagl.; Finsch, Die Papag. ii. p. 763 (1868).

[No. 325. Male: eyes red.—*J. M.*]

One "male" (No. 335) not fully adult, bought alive at Ternate¹.

6. CYANALCYON DIOPS (Temm.).

Alcedo diops, Temm. Pl. Col. 272 (1824) (type examined).

Halcyon diops, Steph.; Sharpe, Mon. Alced. pl. 77 (1868–1871).

[No. 334. Male: eyes black; stomach had insects.—*J. M.*]

7. PACHYCEPHALA MENTALIS, Wall.

Pachycephala melanura, part., Bp. Consp. i. p. 388 (ex Moluccis) (1850); G. R. Gr. (nec Gould), P. Z. S. 1860, p. 353; Schleg. Ned. Tijdschr. voor de Dierk. iv. p. 44 (1871).

Pachycephala albicollis, Temm. Mus. Lugd. (nec Lafr.) (Bp. l. c.).

Turdus armillaris, Temm. (Bp. l. c.).

Lanius cucullatus, Licht. (Bp. l. c.).

Pachycephala mentalis, Wall. P. Z. S. 1863, p. 30 (type examined).

Pachycephala nigrimentum, G. R. Gr. Hand-list, i. p. 388. sp. 5880 (1869), descr. nulla (type examined).

[No. 333. Male: stomach had insects.—*J. M.*]

8. CYRTOSTOMUS FRENATUS (S. Müll.).

Nectarinia frenata, S. Müll. Verh. Land- en Volkenk. p. 173 (note) (1843).

Cinnyris frenatus, Shelley, Mon. Cinnyr. pt. iii. (1877).

Cyrtostomus frenatus, Salvad. Atti R. Ac. Sc. Tor. xii. p. 317 (1877).

¹ 5. LORIUS CYANAUCHEN (Müll.).

Psittacus cyanauchen, S. Müll. Verhandl. Land- en Volkenk. p. 107 (1839–1844) (type examined).

Domicella cyanauchen, Finsch, Die Papag. ii. p. 773 (1868).

Domicella lory mysorensis, Meyer, Sitzb. k. Ak. Wiss. Wien, lxx. p. 233 (1874).

[No. 335. Male: eyes red.—*J. M.*]

One "male" bought alive at Ternate, but certainly brought there from the Island of Mysore, in Geelvink Bay, where only *L. cyanauchen* lives in the wild state.

[327. Male: eyes brown; stomach had insects. 329. Female.—*J. M.*]

9. *HERMOTIMIA AURICEPS* (G. R. Gr.).

Nectarinia auriceps, G. R. Gr. P. Z. S. 1860, p. 348.

Hermotimia auriceps, Salvad. Atti R. Ac. Sc. Tor. x. p. 228 (1874).

Cinnyris auriceps, Shelley, Mon. Cinnyr. pt. v. (1877).

[No. 326. Male: eyes brown; stomach had insects.—*J. M.*]

10. *TOTANUS GLAREOLA* (Linn.).

[No. 330. Female: eyes brown; stomach contained shells.—*J. M.*]

II. *Birds from Amboyna.*

[The 'Challenger' arrived at Amboyna on Sunday 4th Oct., 1874, and sailed from Amboyna on the 10th Oct., 1874, at 4 P.M.—*J. M.*]

During the stay 23 birds were procured, representing 15 species, as follows¹:—

1. *UROSPIZIAS IOGASTER* (S. Müll.)

Falco iogaster, S. Müll. Verh. Land- en Volkenk. p. 110, note (1839–1844) (type examined).

Astur iogaster, Sharpe, Cat. Accipitr. p. 104 (1874).

[No. 302. Male: eyes coral-red; legs orange; stomach had fish-bones and crabs.—*J. M.*]

2. *GEOFFROYUS RHODOPS* (G. R. Gr.).

Psittacus fuscicapillus, Vieill. N. D. xxv. p. 316, Java! (1817), (descr. falsa; type examined) (♀).

Psittacus rhodops, G. R. Gr. P. Z. S. 1861, p. 436, Waigiou! and Mysol! (descr. nulla; type examined).

Eclectus rhodops, Schleg. Mus. P.-B. *Psittaci*, p. 43 (1864), Ceram, Amboyna, and Bouru.

Pionias rhodops, part., Finsch, Die Papag. ii. p. 380 (1868).

Geoffroyus schlegelii, Salvad. Ann. Mus. Civ. Gen. x. p. 29. no. 40, Buru, Boano, Ceram, Amboyna, Arouko, Goram, Monawolka (1877).

[No. 304. Male: eyes white; bill, upper part reddish, lower blackish.—*J. M.*]

This species resembles *G. aruensis* (G. R. Gr.); but it is larger, has the under wing-coverts of a darker blue, and the female has a darker brown head.

The type of *Psittacus fuscicapillus*, Vieill., is certainly a female of this species; but the description is wrong, as also the locality.

Psittacus rhodops, G. R. Gr. (*l. c.*), was said to be from Waigiou and Mysol; but knowing that in these islands lives a representative

¹ [Besides the skins examined by Count T. Salvadori, two Cassowaries were procured alive, and the skins afterwards preserved. They appear to be immature examples of *Casuaris galeatus*, or of a very closely allied species.—P. L. S.]

form, *Geoffroyus pucherani*, Bp., I thought that it could not be the same bird as *Electus rhodops*, Schleg., from the Ceram group; accordingly I gave to Schlegel's species the name of *Geoffroyus schlegelii*. Having, however, quite recently seen Gray's types in the British Museum, I find that they really belong to the Ceramese species; and I am quite sure that the localities Waigiou and Mysol are wrong. Those specimens no longer bear Wallace's original labels, which circumstance may explain how it was that wrong localities have been attributed to them.

3. CEYX LEPIDA, Temm.

Ceyx lepida, Temm. Pl. Col. 595. f. 1, Amboyna (1836); Sharpe, Mon. Alced. pl. 46 (pt. ii. 1868).

[No. 303. Female: bill and legs red; eyes black; stomach had insects.—*J. M.*]

4. MACROPTERYX MYSTACEA (Less).

Cypselus mystaceus, Less. Voy. Coq. Zool. Atlas, pl. 22 (1826) (type examined).

Macropteryx mystacea, Salvad. Ann. Mus. Civ. Gen. x. p. 311. sp. 1 (1877).

[298. Male; 299. Female: eyes black; stomach had insects.—*J. M.*]

Two specimens—one "male" (No. 298), with the brown spot on the ear-coverts, and one female (No. 299), without the brown spot.

5. CYRTOSTOMUS ZENOBIA (Less.).

Cinnyris zenobia, Less. Voy. Coq. Zool. Atlas, pl. 30. f. 3 (1826), i. 2, p. 679 (1828)¹.

Cinnyris clementia, Less. Dict. Sc. Nat. i. p. 18 (1827).

Cyrtostomus melanogaster, G. R. Gr. Hand-list, i. p. 112. sp. 1390 (1869), descr. nulla.

Cyrtostomus zenobia, Salvad. Atti R. Ac. Sc. Tor. xii. p. 319 (1877).

[No. 308. Male; 312. Female; 313. Male: eyes black; stomach contained insects.—*J. M.*]

Three "males" (No. 308, 312, 313), apparently fully adult; all three have the feathers of the forehead tipped with metallic blue; one of them (No. 313) has the upper parts more greenish than the other two, which have the same parts of a rich olive-brown.

6. HERMOTIMIA ASPASIOIDES (G. R. Gr.).

Nectarinia aspasioides, G. R. Gr. P. Z. S. 1860, p. 348, Amboyna.

Hermotimia aspasioides, Salvad. Atti R. Ac. Sc. Tor. x. p. 208, 216 (1874), xii. p. 306 (1877).

Cinnyris aspasioides, Shelley, Mon. Cinnyr. pt. v. (1877).

¹ I have not been able to find the type of this species in the Museum of Paris.

[314. Male: eyes black. 312. Female: eyes black; stomach had insects.—*J. M.*]

Two specimens—one “male” (No. 314) not fully adult, with the green cap mixed with blue, and one “female” (No. 312).

7. *DICÆUM VULNERATUM*, Wall.

Dicæum vulneratum, Wall. P. Z. S. 1863, p. 32, note (Ceram; type examined).

[No. 315. Female: eyes brown; stomach had insects and seeds. Small bird.—*J. M.*]

This sex has not yet been described.

Fem. *Superne cinereo-fusca, alis et cauda obscurioribus, paullum nitentibus; pileo præsertim frontem versus brunneo tincto; supracaudalibus rubris; inferne cinerea; gastræo medio seu gula, colli antici, pectoris abdominisque parte media et subcaudalibus albis; rostro et pedibus fuscis.*

8. *BUDYTES VIRIDIS* (Gm.).

[305. Male: eyes brown; legs and bill black; stomach had insects. 310. Female: eyes brown. 319. Male: eyes brown; stomach had insects.—*J. M.*]

Three specimens—one “male” (No. 305) and one “female” (No. 310) scarcely different, and one “male” (No. 319) with the underparts of a paler yellow, and with the back rather greyish.

9. *MACROPYGIA AMBOINENSIS* (Linn.).

[301. Male: eyes red; feet red; bill black; fruit in stomach. 320. Female: eyes orange; stomach had seeds; legs red.—*J. M.*]

Two specimens—one fully adult “male” (No. 301), and one “female” (No. 320). The female has the cap of a uniform cinnamon colour, the breast more reddish than the male, and no green or purplish reflections on the nape, which is finely mottled with dark brown and reddish fulvous.

10. *CHARADRIUS FULVUS* (Gm.).

[No. 317. Male: eyes hazel; stomach contained worms and land-shells.—*J. M.*]

11. *EUDROMIAS VEREDUS* (Gould).

Charadrius veredus, Gould, P. Z. S. 1848, p. 38; id. B. Austr. vi. pl. 14.

Eudromias veredus, Harting, Ibis, 1870, p. 209, pl. vi.

[No. 318. Male: eyes hazel; stomach contained worms and land-shells.—*J. M.*]

12. *ÆGIALITIS GEOFFROYI* (Wagl.).

Charadrius geoffroyi, Wagl. Syst. Av. gen. *Charadrius*, sp. 19 (1827).

Ægialitis geoffroyi, Harting, Ibis, 1870, p. 378, pl. xi.

[No. 311. Male: eyes brown.—*J. M.*]

13. *TRINGOIDES HYPOLEUCUS* (Linn).[No. 306. Female: eyes hazel; stomach had insects.—*J. M.*]14. *GALLINAGO STENURA* (Kuhl).“*Scolopax stenura*, Kuhl,” Bp. Ann. Stor. Nat. iii. fasc. x (1830).*Gallinago stenura*, Schleg. Mus. P.-B. *Scolopaces*, p. 12 (1864);
Salvad. Cat. Syst. Ucc. di Borneo, p. 334. sp. 353 (1874).[No. 316. Male: eyes black; stomach had worms.—*J. M.*]15. *BUTORIDES JAVANICA* (Horsf.).*Ardea javanica*, Horsf. Trans. Linn. Soc. xiii. p. 190 (1820);
Schleg. Mus. P.-B. *Ardeæ*, p. 43 (1863).*Butorides javanica*, Salvad. Cat. Ucc. di Borneo, p. 351. sp. 370
(1874).[No. 300. Male: eyes orange; legs yellow; bill black; crustacea
in stomach. 309. Female: eyes yellow; legs green.—*J. M.*]Two specimens—one “male” (No. 300) fully adult, and a young
“female” (No. 309).III. *Birds from Banda.*[The ‘Challenger’ arrived at Banda on the 29th September, 1874,
and sailed from Banda on the evening of the 2nd October, 1874.—
J. M.]Only 10 specimens, belonging to 7 species, are in the collection,
which, although a very small one, is of some interest, as birds from
Banda are rather scarce in Museums.1. *SAUROPATIS CHLORIS* (Bodd.).[No. 293. Male; 294. Female: eyes black; legs have a dull
brown tinge; base of the lower mandible white, the rest black.—
J. M.]2. *MONARCHA INORNATUS* (Garn.).*Muscicapa inornata*, Garn. Voy. Coq. Zool. Atlas, pl. 16. f. 2
(1826), & i. 2, p. 591 (1828), New Guinea (type examined).*Drymophila cinerascens*, Temm. Pl. Col. 430. f. 2 (1827), Timor
(type examined).*Monarcha fulviventris*, Hartl. P. Z. S. 1867, p. 830, Echiquier
Islands (type examined).[No. 292. Male: eyes brown; legs and bill slate-blue; the bill
lighter than legs; stomach contained insects.—*J. M.*]After having examined the types mentioned above and having
compared together many specimens from Timor, Banda, Amboyna,
Goram, Tijoor, Ternate, Halmahera, Batchian, Tifore, Sula, Ké
Islands, Aru Islands, Mysol, New Guinea (Sorong, Dorei, and Man-
nam), Mafor, the Admiralty Islands, and the Echiquier group, I
have arrived at the conclusion that they all belong to one species.
The *Drymophila cinerascens*, Temm., represents the fully adult bird;

and the *Muscicapa inornata*, Garn., is the young stage of the same, differing from the adult in the reddish colour of the outer edgings of the remiges. Under the name of *M. fulviventris* Hartlaub has described a specimen from the Echiquier group, with the abdomen rather pale, exactly like others from the other localities mentioned above.

3. RHIPIDURA SQUAMATA, S. Müll.

Rhipidura squamata, S. Müll. Verh. Land- en Volkenk. p. 189 (1839-1844), Banda (type examined).

Rhipidura griseicauda, Salvad. Ann. Mus. Civ. Gen. vii. p. 924. sp. 20 (1875), Waigiou.

[No. 289. Female: eyes hazel; stomach contained insects.—*J. M.*]

This species is allied to *R. rufifrons* (Lath.) from Australia, from which it differs in having the forehead black in the middle and white on the sides; the tail is grey, white-tipped, and with scarcely any reddish colour near the base. S. Müller described this species with the tail brown-black, instead of grey; and this mistake made me believe that the bird from Waigiou, described by me, was different.

4. PACHYCEPHALA PHÆONOTA (Müll.).

Myiolestes phajonotus, Müll. Mus. Lugd. (type examined); Bp. Consp. i. p. 358 (1850), Banda.

Pachycephala brunnea, Wall. P. Z. S. 1865, p. 478, Banda, Salvatty (type examined).

Pachycephala senex, Pelz. Verh. k. zool.-bot. Gesellsch. Wien, 1872, p. 429, Aru (type examined).

[No. 290. Male; 291. Female: eyes light hazel; legs flesh-colour; stomach contained insects.—*J. M.*]

The sexes are exactly alike.

The types in the Museum of Leyden are marked "Borneo," which is a mistake; Bonaparte has given the exact locality.

This species has a very extensive range; I have seen specimens from Banda, Ceram-laut, Mysol, Salvatty, Waigiou, Mafor, Ternate, Dammar, Mareh, Motir, and Tifore. It is not quite certain that the bird described by Von Pelzeln (*l. c.*) was really from the Aru Islands.

5. MYZOMELA BOIEI, S. Müll.

Nectarinia (Myzomela) boiei, S. Müll. Verh. Land- en Volkenk. p. 172 (1839-44) (type examined).

[No. 295. Female: eyes brown; stomach had insects. The male of this bird had a red head; but no specimen was shot.—*J. M.*]

6. ZOSTEROPS CHLORIS, S. Müll.

Zosterops chloris, S. Müll. in Mus. Lugd. (type examined); Bp. Consp. i. p. 398 (1850); Hartl. Journ. f. Orn. 1865, p. 24.

[No. 287. Male; 288. Female: eyes brown; legs slate-colour;

stomach contained insects. In flocks on trees near the shore.—*J. M.*]

The sexes are exactly alike.

To this species have been referred also specimens from Ternate and Bouru; but those from Ternate agree better with *Z. intermedia*, Wall., from Celebes; and one specimen from Bouru in the British Museum, collected by Wallace, belongs to a species not yet described.

7. CARPOPHAGA CONCINNA, Wall.

Carpophaga chalybura, G. R. Gr. (nec Bp.), P. Z. S. 1858, pp. 187, 196 (Aru).

"*Carpophaga chalybea*, Bp." (errore), Rosenb. Journ. f. Orn. 1864, p. 132. sp. 226 (Aru).

Carpophaga concinna, Wall. Ibis, 1865, p. 383. no. 52, Matabello Island, Aru (a small island west of) (type examined); Salvad. Ann. Mus. Civ. Gen. ix. p. 200. no. 39 (1876).

Carpophaga roseinucha, part., Schleg. Ned. Tijdschr. Dierk. iii. p. 197 (1865).

[No. 296. Female. This bird was sent on board alive as a present to the Professor.—*J. M.*]

IV. *Birds from the Ké Islands.*

[The ship arrived at Ké Doulan, Ké Islands, on the morning of the 25th September, 1874, and left on the morning of the 26th September.—*J. M.*]

The birds from Ké Islands are 25, representing 14 species; they have been all collected at the little island named Dulan¹.

The Ké Islands were quite unknown to naturalists before Wallace made a short stay there of six days in January 1857. He only obtained thirteen species in all², which were catalogued, together with those from the Aru Islands, by Mr. G. R. Gray³. Von Rosenberg made a longer stay on the Ké Islands, and collected there rather extensively; but no complete catalogue of his collection has been published. He gave an account of his visit to the Ké Islands, and of some of the birds collected there by him, in his 'Reis naar de zuidoostereilanden gedaan en 1865,' pp. 67–83.

Dr. Beccari in 1873 made a rather large collection of birds in the Ké Islands. Of this some of the new species have been already described by me⁴; but I propose to give a complete account of it as soon as my occupations permit.

¹ Cosmos di Guido Cora, ii. tav. ii. (1874).

² Ann. & Mag. Nat. Hist. (2), xx. p. 473 (1857).

³ P. Z. S. 1858, pp. 169–198.

⁴ "Nuove specie di uccelli delle Isole Aru e Kei, raccolte da Odoardo Beccari," Ann. Mus. Civ. Gen. vi. pp. 73–80 (1874); "Altre nuove specie di uccelli raccolte nella Nuova Guinea dal Signor L. M. D'Albertis e nelle Isole Aru e Kei dal Dott. O. Beccari," *op. cit.* vi. pp. 308–314; "Descrizione di sei nuove specie di uccelli delle Moluche, delle Kei e delle Isole Aru," *op. cit.* vii. pp. 983–990 (1875).

1. *PANDION LEUCOCEPHALUS*, Gould.

Pandion leucocephalus, Gould, P. Z. S. 1837, p. 138; id. B. Austr. i. pl. 6 (1848); Sharpe, Cat. Acciptr. p. 451 (1874).

[No. 268. Male: eyes yellow; legs whitish; bill black; stomach contained fish. Shot by Chauner; no others were seen. Shot far in the bush from the shore.—*J. M.*]

2. *GEOFFROYUS KEYENSIS*, Schleg.

Psittacus capistratus, G. R. Gr. (nec Bechst.), P. Z. S. 1858, p. 183 (♀), Ké Islands (type examined).

Eclectus personatus (part.), Schleg. Ned Tijdschr. Dierk. iii. p. 332 (A. grande forme (partim), p. 333) (1866); id. Mus. P.-B. *Psittaci*, Revue, p. 18 (partim) (1875).

Pionias rhodops (part.), Finsch, Die Papag. ii. pp. 388, 955 (1868).

Geoffroyus keyensis, Schleg. MS. (Finsch, Die Papag. ii. p. 956); Salvad. Ann. Mus. Civ. Gen. x. p. 29. sp. 37 (1877).

[No. 271. Male; 269, 270. Females: eyes white; upper mandible red in the male, both black in the females; stomach contained seeds and fruit.—*J. M.*]

Three specimens—a young “male” (No. 271) in transitional plumage, an adult “female” (No. 270) with the head pale brown olive, and a not fully adult “female” (No. 269) with the head conspicuously tinged with green.

3. *EOS RUBRA* (Gm.)

Domicella rubra, Finsch, Die Papag. ii. p. 786 (1868).

Psittacus (Eos) bernsteinii, Rosenb. Nat. Tijdschr. v. Ned. Ind. xxv. p. 145 (1863), Ké Islands.

Lorius squamatus, Schleg. (nec Bodd.), Mus. P.-B. *Psittaci*, p. 124. no. 1, 2 (1864) (types examined).

Domicella schlegelii, Finsch, Die Papag. ii. p. 792 (1868), Ké Islands (type examined).

[No. 272. Male; 273. Female: eyes light red; bill dull red; legs black; stomach contained seeds with some insects. Only two were shot. The Professor has one of the same species alive on board, bought at Ké Doulan.

No. 324. Female: eyes brown; legs black; bill rose-coloured. This bird was purchased alive at Ké Doulan, Ké Islands, and kept till today (Oct. 12, 1874) on board, and was killed on account of the noise it made.—*J. M.*]

Three specimens—one “male” (No. 272) and one “female” (No. 273) fully adult and alike, and a “female” (No. 324) not fully adult, with some of the feathers of the underparts edged with blue and turning to greenish in the hidden part.

The *Domicella schlegelii*, Finsch, l. c. (= *Lorius squamatus*, Schleg.), was established on some young birds, which have the feathers of the underparts edged with blue; the same thing happens in the young of *E. riciniata* and of *E. cyanogenys*.

4. *RHIPIDURA ASSIMILIS*, G. R. Gr.

Rhipidura assimilis, G. R. Gr. P. Z. S. 1858, p. 176, Ké Islands (type examined).

[No. 286. Male: insects in the stomach; eyes black.—*J. M.*]

This species is allied to *R. isura*, Gould, from Australia, and to *R. setosa* (Q. & G.) from New Ireland and New Guinea; it differs from the first in the larger dimensions, in the paler band across the breast, and in the spot at the tip of the two outer tail-feathers less extended and light fulvous instead of white; from *R. setosa* it is easily distinguished by the upper tail-coverts rufescent.

5. *GRAUCALUS POLLENS*, Salvad.

Graucalus pollens, Salvad. Ann. Mus. Civ. Gen. v. p. 75 (1874).

[No. 280. Female: eyes black; stomach contained seeds; feet and bill black.—*J. M.*]

This specimen agrees entirely with the typical females described by me. This species comes next to *G. caledonicus* (Gm.) from New Hebrides and New Caledonia; but it differs in the dimensions being somewhat smaller and in the darker colour. It is also allied to *Gr. personatus*, Müll., from Timor; but it is larger, darker, and also conspicuously different in the under wing-coverts, which are *not white*, but dark like the rest of the plumage.

In the British Museum I have seen a *Graucalus*, said to have been collected by Wallace in the Sula Islands, and wrongly named *G. temmincki*, which is very much like the females from the Ké Islands, except that it is a little smaller.

6. *LALAGE KARU* (Less.).

Lanius karu, Less. Voy. Coq. Atlas, pl. 16 (1826).

Ceblepyris karu, Less. Voy. Coq. Zool. i. 2, p. 633 (1828) (type examined).

Lalage karu, Hartl. Journ. f. Orn. 1865, p. 168.

[Nos. 282, 283. Males: eyes black; stomach contained in the one seeds, in the other insects.—*J. M.*]

Two specimens, one "male" (No. 282) fully adult, with the upper parts shining black, the under wing-coverts pure white, and the breast and the abdomen barred across; this is exactly like another specimen from Naiabui, collected by Signor D'Albertis and marked female (!) (Ann. Mus. Civ. Gen. ix. p. 28. sp. 108, 1876). The second specimen (No. 283) is also marked "male:" it is not fully adult; it has the upper parts grey, and the under wing-coverts, as well as the underparts, tinged with reddish.

I suspect that to the same species must be referred the *Ceblepyris rufiventris*, Jacq. & Pucher., and I question whether it really was from Raffles Bay. The type of this species, examined by me in the Museum of Paris, agrees entirely with two specimens from the Aru Islands, collected by Beccari, and which are exactly like the type of *Lalage polygrammica*, G. R. Gr., also from the Aru Islands.

7. *DICRUOPSIS MEGALORNIS* (G. R. Gr.).

Dicrurus megalornis, G. R. Gr. P. Z. S. 1858, pp. 199, 193, Ké Islands (type examined).

Chibia megalornis, Sharpe, Cat. Birds in the Brit. Mus. iii. p. 242. no. 9 (1877).

[Nos. 274, 275. Both females: eyes red; legs and bill black; stomach contained insects.—*J. M.*]

This bird and the other allied Austro-Malayan species have been united by Mr. Sharpe to the genus *Chibia*, Hodgs., the type of which, *Chibia hottentotta* (Linn.), has a much longer and more acute bill, and is also very conspicuous for the tuft of silky hairs springing from the forehead—a feature which, among the Austro-Malayan species, is only to be found in *Dicrurus pectoralis*, Wall., from the Sula Islands¹.

8. *PHILEMON PLUMIGENIS* (G. R. Gr.).

Tropidorhynchus plumigenis, G. R. Gr. P. Z. S. 1858, pp. 174, 191, Ké Islands (type examined).

[No. 276. Male; 277. Sex uncertain: eyes brown; stomach contained seeds.—*J. M.*]

Both are young birds, with the feathers of the sides of the breast with broad yellow edges, and with the outer edges of the remiges tinged with olive.

9. *CALORNIS METALLICA* (Temm.).

Lamprotornis metallicus, Temm. Pl. Col. 266, 1824, Amboyna (type examined).

Calornis viridescens, G. R. Gr. P. Z. S. 1858, p. 181, Aru Islands (type examined).

Calornis nitida, G. R. Gr. P. Z. S. 1858, p. 181, New Ireland (type examined).

Calornis amboinensis, G. R. Gr. P. Z. S. 1858, p. 182, Amboyna (type examined).

Calornis gularis, G. R. Gr. P. Z. S. 1861, p. 431, Mysol (type examined).

Calornis purpurascens, G. R. Gr. Hand-list ii. p. 26. no. 6377, (1870), Goram (type examined).

[No. 284. Female: eyes red; stomach contained seeds; caught by Suhm in a spider's web.—*J. M.*]

One fully adult "female" (No. 284), resembling a fully adult male.

This species has been found in nearly all the Moluccan and Papuan Islands, from the Sula Islands westward to the Solomon Islands eastward, and lives also in the northern part of Australia.

Temminck, in the text of the 'Planches Coloriées,' says that his

¹ I think that the Austro-Malayan species may be more properly referred to a peculiar genus, which I propose to call *Dicruopsis*, characterized as follows:—*Rostrum crassum, rostro specierum generis Dissemuri simile, sed culmine minus acuto, crassiusculo; cauda bifida divaricata, rectricibus extimis superne introrsum paulum convolutis.*

L. metallicus was from Timor and Celebes ; but this seems to be a mistake, as the typical specimens in the Museum of Leyden, examined by me, are from Amboyna. In Celebes and in Timor lives another species of the genus *Calornis*, and not *C. metallicus*.

Specimens from the different localities do not differ specifically : those from Cape York are somewhat more purplish, but not always in the same way ; one from Goram, a small island near Amboyna (*C. purpurascens*, Gray), is exactly like some specimens from Cape York.

Some specimens have the throat more purplish than others ; one from Mysol (*C. gularis*, Gray) cannot be separated from others from Halmahera and Cape York.

10. CARPOPHAGA CONCINNA, Wall.

[Nos. 263–264. Males ; 265, 266, 267. Females : eyes between orange and a coral-red ; the stomach in all contained fruit and seeds ; legs coral-red ; bill black. There were a great many of these Nutmeg Pigeons shot, enough for lunch for the whole ward-room. They were very good eating.—*J. M.*]

11. MYRISTICIVORA BICOLOR (Scop.).

Myristicivora bicolor, Salvad. Ann. Mus. Civ. Gen. ix. p. 276 (1877).

[No. 278. Male : white Pigeon ; eyes brown ; stomach contained fruit ; feet blue ; bill black.—*J. M.*]

This bird has the under tail-coverts entirely white.

In a recent paper of mine¹ I have shown that *M. bicolor* (Scop.), *M. spilorrhoa* (G. R. Gr.), and *M. melanura*, G. R. Gr., are perfectly distinct species, and that *M. bicolor* (Scop.) most likely is a migratory bird in the Moluccas, as it is in Celebes, and that, while in Celebes it is to be found together with *M. luctuosa* (Reinw.), in the Moluccas it lives together with *M. melanura*, Gray.

12. MACROPYGIA KEYENSIS, Salvad.

Macropygia, sp., Wall. Ann. & Mag. Nat. Hist. (2) xx. p. 473 (partim), 1875, Ké Islands.

Macropygia phasianella, part., G. R. Gr. (nec Temm.), P. Z. S. 1858, pp. 187, 196, Ké Islands ; Wall. Ibis, 1865, p. 389. sp. 81 (partim) ; Rosenb. Reis naar zuidoostereil. p. 81 (1867).

Macropygia turtur, part., Schleg. Mus. P.-B. *Columbæ*, pp. 110, 113, 114 (specimina Ins. Key), 1873.

Macropygia keyensis, Salvad. Ann. Mus. Civ. Gen. ix. p. 204. sp. 64 (1876).

[No. 279. Male : eyes hazel ; stomach contained seeds ; legs red ; bill black.—*J. M.*]

I named this Ké-Islands species (*l. s. c.*) before seeing a fully adult bird, feeling quite confident, from Schlegel's description, that it was really distinct. I have recently seen the adult specimens contained in the Leyden Museum, and I am satisfied that the Ké-

¹ " Osservazioni intorno alle speci del genere *Myristicivora*, Rehb." (Ann. Mus. Civ. Gen. ix. pp. 265–277).

Islands bird belongs to a peculiar form. I shall now give a full description of the adult bird collected during the 'Challenger' expedition, and shall proceed after to point out the principal differences from the allied forms.

Capite rufo-vinaceo, sincipite et genis pallidioribus; vertice et occipite grisescentibus; collo postico viridi et purpureo nitente, conspicue cinerascens; dorso, uropygio, supracaudalibus alarumque tectricibus exterioribus brunneo-cinnamomeis, punctulis nigris obsoletis adspersis; gula rufescenti-albida; collo antico et pectore summo vinaceis, fasciis transversis nigris notatis; pectore imo et abdomine albido-fulvescentibus, fasciis transversis nigris notatis; abdominis lateribus et subcaudalibus brevioribus pallide cinnamomeis, nigro transfasciatis; subcaudalibus longioribus et tectricibus alarum inferioribus cinnamomeis unicoloribus; remigibus fuscis, exterius cinnamomeo limbatis; cauda superne brunneo-grisescens, inferne pallidior et magis grisescens; rectricibus tribus utrinque lateribus partim læte rufis, fascia lata subapicali nigra notatis; rostro nigro; pedibus rubris.

Long. tot. circa 0^m.370; al. 0^m.018; caud. 0^m.190; rostr. 0^m.018; tarsi 0^m.021.

This species is intermediate between *M. amboinensis* (Linn.) and *M. doreya* (Bp.).

It differs from *M. amboinensis* (which it much resembles in the light underparts):—

1st. In the greyish tinge of the vertex, of the occiput, and of the hind neck;

2nd. In the more vinaceous colour of the front neck;

3rd. In the more whitish underparts;

4th. In the darker hue of the back;

5th. In the larger dimensions.

From *M. doreya*, Bp., to which it bears a great resemblance in the upper parts, it differs:—

1st. In the more greyish hind neck;

2nd. In the much less vinaceous front neck and upper breast;

3rd. In the more whitish underparts;

4th. In the lighter and more greyish tail;

5th. In the larger dimensions.

13. TRINGOIDES HYPOLEUCUS (Linn.).

[No. 285. Eyes black; stomach contained portion of shells.—*J. M.*]

14. NUMENIUS UROPYGIALIS, Gould.

[No. 281. Female: eyes black; stomach contained crustacea (crabs).—*J. M.*]

In my Catalogue of the Birds of Borneo I have referred this eastern form to *N. phæopus* (Linn.); but now I think that *N. uropygialis*, Gould, with the uropygium constantly mottled with dark grey, is entitled to specific rank.

V. *Birds from the Aru Islands.*

[The ship arrived at Dobbo, Aru Islands, about noon on the 16th September, 1874. The same afternoon some birds were shot near the village of Dobbo; these were all put in spirits. On the 17th a large party landed on the island of Wokan and shot thirty-two specimens. On the 19th September thirteen specimens were shot at Wanumbai, and on the afternoon of the 22nd and morning of the 23rd seventeen more. The ship left Aru on the morning of the 23rd September, 1874, at 6 P.M.—*J. M.*]

The birds collected in the Aru Islands are 61, belonging to 40 species; they are from three different localities—Wokan, Wanumbai, and Dobbo, already visited by Wallace, Von Rosenberg, or Beccari.

Only one species, *Drymaædus beccarii*, lately described by me from the Arfak Mountains, is new to the islands.

1. CUNCUMA LEUCOGASTER (Gm.).

Haliaëtus leucogaster, Sharpe, Cat. Accipitr. p. 307 (1874).

[No. 262. Female: eyes yellow; stomach contained fish. Shot on Wokan on 21st September. Skinned by Crosbie.—*J. M.*]

This bird is in transitional plumage, like the specimen figured by Schlegel, Valkvog. pl. 4. f. 2.

2. HALIASTUR GIRRENERA (Vieill.).

Haliaëtus girrenera, Vieill. Gal. Ois. i. p. 31 (syn. emend.), pl. x. (1825) (type? examined).

[No. 235. Male: eyes red; stomach contained crabs and cuttlefish. Shot on Wokan.—*J. M.*]

I have found in the Museum of Paris a specimen marked "Papous (Freycinet, 1820)," which seems to be the type of Vieillot.

3. UROSPIZIAS POLIOCEPHALUS (G. R. Gr.).

Accipiter poliocephalus, G. R. Gr. P. Z. S. 1858, pp. 170, 189, Aru Islands (type examined); Sclat. Ibis, 1859, p. 276, 1860, p. 322, pl. x. (fig. avis adultæ tantum); Rosenb. Nat. Tijdschr. Ned. Ind. xxv. p. 228. n. 47 (1863); id. Journ. f. Orn. 1864, p. 116. n. 47; Kaup, P. Z. S. 1867, p. 177; Wall. Ibis, 1868, p. 12 (partim); Salvad. Ann. Mus. Civ. Gen. vii. p. 75, sp. 7, Ansus (1875).

Nisus poliocephalus, part., Finsch, New Guin. p. 155 (1865); Schleg. Ned. Tijdschr. Dierk. iii. p. 326 (partim) (1866); id. Mus. P.-B. Revue Accipitr. p. 88 (1873); Gieb. Thes. Orn. ii. 711 (1875).

Urospiza poliocephalus, G. R. Gr. Hand-list, i. p. 34. sp. 336 (1869).

Astur poliocephalus, Rosenb. Reis naar zuidoostereil. p. 36 (1862); Sharpe, Cat. Accipitr. p. 117 (specim. a, b tantum) (1874).

Urospizias poliocephalus, Gurn. Ibis, 1875, p. 365.

Astur contumax, Rosenb. Reis naar zuidoostereil. p. 36 (Aru), descr. nulla (1867).

Urospizias spilothorax, Salvad. Ann. Mus. Civ. Gen. vii. p. 900. sp. 1 (1875), Arfak and Jobi, x. pp. 115, 117. sp. 5 (1877).

Accipiter etorques, part., Sclat. P. Z. S. 1877, p. 109. n. 45 (young specimen).

[No. 253. Male, from Wanumbai.—*J. M.*]

This bird is young.

I have found in the museums of Leyden and Berlin two specimens which are very much like my *U. spilothorax*; but they have only a few longitudinal dark spots on the lower part of the breast, showing that these spots are not a permanent character, and that my *U. spilothorax* represents only a stage of *U. poliocephalus*.

4. MICROGLOSSUS ATERRIMUS (Gm.).

[No. 206. Wokan. Male: eyes black; cheek-membrane red; stomach contained many of the insides of kernels of nuts. This was shot on the top of one of the highest trees. Only one seen at the time.—*J. M.*]

I have seen many specimens from the Aru Islands, and these are in general much smaller than those from New Guinea; and I think that the type of *Psittacus alecto*, Temm., which I have seen in the Museum of Leyden, must have come from the Aru Islands¹. I do not think that there is more than one species of the genus *Microglossus*.

5. CYCLOPSITTACUS MELANOGENYS (Rosenb.).

"*Psittacula melanogenia*, Rosenb." Schleg. Ned. Tijdschr. v. Dierk. iii. p. 330 (1866), Aru (type examined); Rosenb. Nat. Tijdschr. Ned. Ind. xxix. p. 142 (1867).

Psittacula melanogenys, Finsch, Die Papag. ii. p. 626 (1868).

Cyclopsittacus melanogenys, Salvad. Ann. Mus. Civ. Gen. x. p. 29, sp. 33 (1877).

[No. 207. Wokan. Female: eyes black; legs with a greenish tinge.

No. 208. Wokan. Probably a male; but the specimen was too much injured to determine.—*J. M.*]

The example, without indication of the sex, is most likely a female, having the ear-coverts orange.

6. ECLECTUS POLYCHLORUS (Scop.).

Psittacus polychlorus, Scop. Del. Flor. et Faun. Insubr. p. 87, n. 27 (1786) (ex Sonnerat), ♂.

Eclectus linnæi, Wagl. Mon. Psitt. p. 571, t. xxi. (1832), ♀.

Eclectus polychlorus, var. *aruensis*, G. R. Gr. P. Z. S. 1858, p. 183.

¹ The specimen in the Berlin Museum, which has been regarded as a second one of *M. alecto*, looks smaller than the New-Guinea specimens from having the primaries cut off.

Eclectus polychlorus, Salvad. Ann. Mus. Civ. Gen. x. p. 31. sp. 7 (1877).

[No. 212. Wokan. Male: eyes orange; upper mandible red towards the base, and whitish-yellow towards the tip; lower one jet-black; stomach contained inside-coating of cocoa-nut, and some species of comminuted red coral (tubular coral); feet black.—*J. M.*]

Mr. G. R. Gray considered the Aru specimens as forming a peculiar race of *E. polychlorus*, on account of the yellowish band at the tip of the tail being more conspicuous and tinged with reddish; but the differences are very slight and not constant.

7. *CHALCOPSITTACUS SCINTILLATUS* (Temm.).

Psittacus scintillatus, Temm. Pl. Col. p. 569 (1835), Lobo, juv. (type examined).

Chalcopsitta rubrifrons, G. R. Gr. P. Z. S. 1858, p. 182. pt. 135 (ad.), Aru (type examined).

Domicella scintillata, Finsch, Die Papag. ii. p. 752 (1868).

Chalcopsittacus scintillatus, Salvad. Ann. Mus. Civ. Gen. x. p. 34, sp. 75 (1877).

[No. 213. Wokan. Male: eyes dull red; feet black; both mandibles black; stomach quite empty.

No. 229. Wokan. Male: eyes orange; feet and bill black; stomach contained insects and leaves.—*J. M.*]

Both specimens are fully adult.

8. *TRICHOGLOSSUS NIGRIGULARIS*, G. R. Gr.

Trichoglossus nigrigularis, G. R. Gr. P. Z. S. 1858, p. 183, Aru (type examined).

Trichoglossus cyanogrammus, part., Finsch, Die Papag. ii. 830 (1868).

[No. 237. Male, Wokan: eyes red, bill red; legs slate-colour; stomach contained small seeds. Shot at Wokan.—*J. M.*]

This species is confined to the Aru Islands and to the Ké Islands, and it is quite distinct from *T. cyanogrammus* (Wagl.), with which it has been assimilated by Wallace, Schlegel, and Finsch.

I have seen many specimens of both species, and I have found that constantly *T. nigrigularis* differs from *T. cyanogrammus*:—

1st. In the red of the breast inclining to orange, paler and with a most conspicuous yellow tint near the dark edges of the feathers.

2nd. The dark edges of the breast-feathers are much narrower, as in *T. massenæ*.

3rd. The head above has only two colours, blue in the anterior half, greenish in the other half; while in *T. cyanogrammus* the head above has three colours, blue on the sinciput, green on the vertex, and purplish-brown on the occiput, like *T. massenæ*.

4th. The middle of the abdomen is generally blackish.

5th. The dimensions are larger.

The Ké-Islands specimens are a little larger than those from the Aru Islands.

9. SAUROPATIS CHLORIS (Bodd.).

Halcyon sordida, var., G. R. Gr. P. Z. S. 1858, p. 172 (Aru).

[No. 244. Female, Dobbo : legs slate, with slightly bluish tinge ; eyes black. Shot on Dobbo on the 20th September, 1874.—*J. M.*]

This bird has the upper parts very dark, and in that respect approaches *S. sordida* (Gould), to which Mr. Gray thought that the Aru birds should be referred ; but I have seen other specimens from the Aru Islands with the upper parts of a much brighter colour, exactly like others from Amboyna, Bouru, and other localities.

The true *S. sordida* (Gould) is a much larger bird.

10. SAUROPATIS SANCTA (Vig. & Horsf.).

Halcyon sanctus, Sharpe, Mon. Alced. pl. 91 (1868–1871).

Sauropatis sancta, Salvad. Ann. Mus. Civ. Gen. x. p. 306, sp. 33 (1877).

[No. 219. Male (young), Wokan : eyes black ; upper mandible and edge of lower black, under base of lower light-coloured ; feet brown.—*J. M.*]

11. SAUROMARPTIS GAUDICHAUDI (Q. & G.).

Dacelo gaudichaudii, Quoy & Gaim. Voy. Uran. Zool. p. 112, pl. 25 (1824), Waigiou, Guebé (type examined) ; Sharpe, Mon. Alced. pl. 116 (1868–1871).

Sauromarptis gaudichaudi, Salvad. Ann. Mus. Civ. Gen. x. p. 306, sp. 35 (1877).

[203. Male ; 204. Female, Wokan : eyes black ; legs greenish, yellow tinge ; stomach contained insects and portions of leaves.—*J. M.*]

The male has the tail blue ; and the female has the tail chestnut.

12. SAUROMARPTIS TYRO (G. R. Gr.).

Dacelo tyro, G. R. Gr. P. Z. S. 1858, p. 171, pl. 133, Aru (type examined) ; Sharpe, Mon. Alced. pl. 117 (1868–1871).

Sauromarptis tyro, Salvad. Ann. Mus. Civ. Gen. x. p. 307, sp. 36 (1877).

[No. 205. Young male ? Wokan : eyes black ; legs greenish-yellow tinge ; stomach contained insects and portions of leaves.—*J. M.*]

This bird differs from the adult in having the underparts entirely reddish, and in the blue of the wings inclining to greenish.

13. ÆGOTHELES WALLACEI, G. R. Gr.

Ægotheles wallacei, G. R. Gr. P. Z. S. 1859, p. 154, Dorey, (type examined) ; Schleg. Ned. Tijdschr. Dierk. iii. p. 340 (1866), Aru ; Salvad. Ann. Mus. Civ. Gen. x. p. 310, sp. 7 (1877).

Caprimulgus brachyurus, Rosenb. Nat. Tijdschr. Ned. Ind. xxix. p. 143 (1867), Aru (type examined).

[No. 259. Female, Wanumbai.—*J. M.*]

I have compared this specimen with the type in the British Mu-

seum and with two other specimens from New Guinea, collected by D'Albertis and Bruijn's men. From all these it differs in the finer vermiculations, and in the somewhat smaller dimensions, and perhaps may belong to a different species; but we must see some more specimens from the Aru Islands before we can decide the question.

The *Caprimulgus brachyurus*, Rosenb., is a young bird with the tail incompletely developed.

14. *MACROPTERYX MYSTACEA* (Less.).

[No. 254. Male, Wanumbai: eyes black.—*J. M.*]

This bird has a brown spot on the ear-coverts.

15. *HIRUNDO JAVANICA*, Sparrm.

Hirundo frontalis, Quoy & Gaim. Voy. Astrol. Zool. i. p. 204, pl. 12. f. 1 (1830), Dorey (type examined).

[No. 225. Female, Dobbo: eyes black.—*J. M.*]

16. *HYLOCHELIDON NIGRICANS* (Vieill.).

Hirundo nigricans, Vieill. N. D. xiv. p. 523 (1817), New Holland (type examined).

[No. 226. Male, Dobbo: eyes black. Shot by the Professor at the village of Dobbo.—*J. M.*]

17. *MACHÆRORHYNCHUS XANTHOGENYS*, G. R. Gr.

Machærirhynchus xanthogenys, G. R. Gr. P. Z. S. 1858, p. 176, - Aru (type examined); Salvad. Atti R. Acc. Sc. Tor. x. p. 375. sp. 2 (1875).

[No. 234. Male, Wokan: eyes and bill black; feet slate. Shot at Wokan.—*J. M.*]

18. *GRAUCALUS MELANOPS* (Lath.).

Campephaga melanops, var., G. R. Gr. P. Z. S. 1861, p. 435.

[No. 228. Female, Dobbo: eyes brown; stomach contained insects; legs and bill black. Shot by the Professor at the village of Dobbo.—*J. M.*]

The specimen agrees entirely with *black-faced* Australian males, and with male birds collected by Signor D'Albertis at Yule Island (Ann. Mus. Civ. Gen. vii. (1875), p. 820. sp. 41).

19. *EDOLIOSOMA MUELLERI*, Salvad.

Ceblepyris plumbea, part., S. Müll. (nec Wagl.), Verh. Land- en Volkenk. p. 189 (1839-1844), New Guinea only (type examined).

Edoliosoma mülleri, Salvad. Ann. Mus. Civ. Gen. vii. p. 928 (1875).

[No. 260, Wanumbai: male. No. 245. Female: eyes hazel; bill black; legs dark with brownish tinge; stomach had insects. Shot on 20th, Dobbo.—*J. M.*]

These specimens agree in every respect with New-Guinea specimens. *Edoliosoma tenuirostre* (Jard. et Selby), from Australia, is scarcely different from the New-Guinea bird; perhaps it is a little larger.

S. Müller, under the name of *Ceblepyris plumbea*, has united a specimen from Utanata and a young bird from Timor; but this, according to me, belongs to a much lighter species, not yet named, of which I have seen adult specimens in the British Museum. With the same name of *C. plumbea* there is in the Leyden Museum a specimen marked "Borneo:" it is a young bird exactly like that from Timor; and I think that the locality is wrong. On the evidence of this specimen Hartlaub (Journ. f. Orn. 1865, p. 155) has asserted the existence of *C. plumbea*, Müll., in Borneo.

20. *DICRUOPSIS ASSIMILIS* (G. R. Gr.).

Dicrurus assimilis, G. R. Gr. P. Z. S. 1858, p. 129, Aru (type examined).

Chibia assimilis, Sharpe, Cat. B. Brit. Mus. iii. p. 239 (1877).

[No. 214. Female, Wokan: eyes dull red; feet and bill black; stomach contained insects.—*J. M.*]

21. *COLLURICINCLA MEGARHYNCHA* (Q. & G.).

Muscicapa megarhyncha, Quoy & Gaim. Voy. Astrol. Zool. i. p. 172, pl. 3. f. 1 (1830), Dorey (type examined).

Napothera elæoides, Müll., Mus. Lugd. (type examined).

Myiolestes aruënsis, G. R. Gr. P. Z. S. 1858, p. 180, Aru (type examined).

Pinarolestes megarhynchus, Sharpe, Cat. B. Brit. Mus. iii. p. 295 (1877).

[No. 240. Male: eyes hazel; legs slate. Shot at Wanumbai.—*J. M.*]

I quite agree with Mr. Sharpe in uniting the Aru bird with the New-Guinea one.

22. *RECTES ARUËNSIS*, Sharpe.

Rectes dichrous, G. R. Gr. (nec Bp.), P. Z. S. 1858, p. 179, Aru.

Rectes aruënsis, Sharpe, Cat. B. Brit. Mus. iii. p. 285 (1877), Aru (type examined)¹.

[No. 238. Female, Wanumbai: eyes dull red; feet slate-colour with a violet tinge; stomach contained land-shells and remains of insects.—*J. M.*]

255. Female, Wanumbai: eyes hazel.—*J. M.*]

These specimens, both marked females, and a female collected by Beccari in the Aru Islands, agree in having the head blackish, the front neck blackish tinged with reddish brown, the uropygium and the upper tail-coverts blackish brown, the tail blackish above, and decidedly reddish brown underneath. These three specimens, all

¹ The type of *Rectes dichrous ceramensis*, Meyer (Sitzb. Ak. Wien, lxxix. p. 208), which I have lately seen in the Museum of Vienna, is a specimen of *R. uropygialis*, Gray, and not of *R. aruënsis*, as Mr. Sharpe suspects. The locality, Ceram, is, no doubt, wrong. *Rectes draschi*, Pelzeln, Verh. z.-b. Gesell. Wien, 1876, p. 218, is a female of *Edoliosoma schisticeps*, G. R. Gr. (ex Hombr. & Jacq. Voy. Pôle Sud, Atlas, Zool. pl. 10. f. 1, ♀).

marked females, differ from two other specimens collected by Beccari, marked males. These have the head, the neck, the tail, and the upper tail-coverts jet-black; and the breast in one specimen is tinged with black more conspicuously than in the others. Ought we to believe that the plumage of the first three specimens, described by Sharpe as that of the young bird, is also the plumage of the adult female, or that by a strange combination all the three specimens marked females are really young ones?

23. *CRATICUS CASSICUS* (Bodd.).

[No. 218. Female, Wokan: eyes dark, deep blue; base of the mandibles light-coloured, with a tinge of blue, tips of mandibles black; stomach with leaves and seeds.—*J. M.*]

24. *CYRTOSTOMUS FRENATUS* (S. Müll.).

[No. 222. Male, Wokan: eyes black; bill and feet black.—*J. M.*]

25. *MYZOMELA NIGRITA*, G. R. Gr.

Myzomela nigrata, G. R. Gr. P. Z. S. 1858, p. 173, Aru (type examined).

Myzomela erythrocephala, Meyer (nec Gould), Sitzb. k. Ak. Wiss. zu Wien, lxx. p. 204 (1874), ♀ and young ♂ (specimens examined).

[No. 232. Wokan, male: eyes hazel; bill and feet black; stomach had insects.—*J. M.*]

Gray describes the male as "entirely shining deep black," omitting to mention that it has the under wing-coverts and the inner edges of the remiges white.

26. *XANTHOTIS FILIGERA* (Gould).

Ptilotis filigera, Gould, P. Z. S. 1850, p. 278, pl. 34, Cape York.

[No. 261. Wanumbai, male.—*J. M.*]

This bird has the light spots on the nape scarcely visible. Two specimens from Utanata, collected by S. Müller, in the Museum of Leyden, belong to this species and not to the northern form *X. chrysotis* (Less.).

27. *DRYMAEEDUS BECCARII*, Salvad.

Drymaeodus beccarii, Salvad. Ann. Mus. Civ. Gen. vii. p. 965. sp. 52 (1875), Arfak.

[No. 257. Wanumbai, male.—*J. M.*]

This example agrees completely with the type from the Arfak Mountains. This is a new species for the Aru Islands.

28. *CALORNIS METALLICA* (Temm.).

[Nos. 215, 216, 217. Males, Wokan: eyes coral-red; bill and legs black; small black seeds in the stomach of the adult males. The above were the most abundant birds we saw on the 17th September 1874.—*J. M.*]

29. MINO DUMONTI, Less.

[No. 250. Wanumbai, male : eyes yellow. No. 233. Wanumbai, female : eyes yellow ; legs and bill yellow ; stomach contained seeds.—*J. M.*]

30. PARADISEA APODA, Linn.

[Nos. 248, 249. Males : eyes yellow. No. 247. Female : eyes brown. No. 202. Young male : eyes pale yellow ; legs light fawn-colour ; the stomach was empty. This bird was shot by Mr. Abbot ; he saw two others at the same time, but noticed none of them with plumes. The Professor and Captain Nares saw a large flock ; and, again, none of them were noticed with plumes. No other specimens were seen by the party. No. 246. Female : eyes brown.—*J. M.*]

Four specimens from Wanumbai, and one from Wokan.

1st. An adult "male" (No. 249), but not in full dress, wanting the long yellow feathers on the sides.

2nd. A "male" (No. 248) not fully adult, having the two middle tail-feathers with very large webs, like the lateral ones, and longer than these, one about two inches, the other only one inch ; they are of a lanceolate shape.

3rd. An adult "female" (No. 247) with yellowish nape.

4th. A young "male" from Wokan (No. 202).

5th. A young "female" (No. 246). The two last are exactly alike in colour ; but the male is larger than the female. Both have no yellow on the nape.

31. CICINNURUS REGIUS (Linn.).

Cicinnurus regius, Salvad. Ann. Mus. Civ. Gen. ix. p. 192. sp. 24 (1876) ; Sharpe, Cat. B. Brit. Mus. iii. p. 171 (1877).

[No. 201. Male : eyes dull red ; legs a delicate sky-blue ; the stomach contained a few remains of insects. This bird was shot by Mr. Abbot ; two others were in company with it at the time. These were the only specimens seen, either by Mr. Abbot or any other of the party. They were not apparently very shy. A gun is said to have been fired, close by, just before they were observed. No. 241. Male, shot at Wokan : eyes dull red ; legs delicate sky-blue or cobalt blue. Nos. 242, 243. Males, shot at Wanumbai. Nos. 250, 251. Males : eyes yellow. No. 252. Male (young) : eyes yellow.—*J. M.*]

Seven specimens—one fully adult "male" (No. 201) from Wokan, and five adult "males" (Nos. 241, 242, 243, 250, 251), and a young "male" (No. 252) from Wanumbai.

32. MANUCODIA ATRA (Less.).

Manucodia atra, Salvad. Ann. Mus. Civ. Gen. ix. p. 189. sp. 4 (1876) ; Sharpe, Cat. B. Brit. Mus. iii. p. 183 (1877).

[Nos. 209, 210. Male, female : eyes orange ; legs black ; the stomach contained fruit and seeds.—*J. M.*]

The male is larger than the female.

33. *ÆLURÆDUS MELANOTIS* (G. R. Gr.).

Ptilonorhynchus melanotis, G. R. Gr. P. Z. S. 1858, p. 181, Aru, (type examined).

Ælurædus melanotis, Gould, B. of New Guinea, pt. i. (1875); Salvad. Ann. Mus. Civ. Gen. ix. p. 193, sp. 28 (1877).

[No. 211. Eyes red; legs with a bluish tinge. Appears to be a young bird; could not make out the sex.—*J. M.*]

Mr. Gould has expressed some doubts about *Æ. arfakianus*, Meyer, being really different from this species; but the greater amount of black on the head and on the neck of *Æ. arfakianus*, the triangular shape of the light spots, with the acute angle turning downwards, on the upper part of the breast, and the smaller dimensions, distinguish at once the New-Guinea bird from its Aruan relative.

34. *PTILOPUS IOZONUS*, G. R. Gr.

Ptilonopus (!) *iozonus*, G. R. Gr. P. Z. S. 1858, p. 186, Aru (type examined).

Ptilopus ionozonus, Salvad. Ann. Mus. Civ. Gen. ix. p. 198. sp. 24 (1876).

[No. 289. Wanumbai, female: legs red; base of upper mandible red, tip yellow; lower green, with the tip lighter; stomach empty.—*J. M.*]

35. *PTILOPUS CORONULATUS*, G. R. Gr.

Ptilonopus coronulatus, G. R. Gr. P. Z. S. 1858, p. 185, pl. 138, Aru (type examined).

Ptilopus coronulatus, Salvad. Ann. Mus. Civ. Gen. ix. p. 198. sp. 26 (1876).

[Nos. 220, 221. Wokan, males: eyes red; bill green; feet red (dull); stomach empty.—*J. M.*]

36. *CARPOPHAGA ZOËÆ* (Less.).

Columba zoëæ, Less. Voy. Coq. Zool. Atlas, pl. 39 (1826), i. pt. 2, p. 705 (1828), Dorey (type examined).

Carpophaga zoëæ, Salvad. Ann. Mus. Civ. Gen. ix. p. 201. sp. 47 (1876).

[No. 236. Wanumbai, male: eyes white; legs red; beak black; stomach contained seeds. Shot at Wanumbai.—*J. M.*]

37. *MACROPYGIA DOREYA*, Bp.

Macropygia doreya, Bp. Conspectus ii. p. 57 (1854), New Guinea (type examined); Salvad. Ann. Mus. Civ. Gen. ix. p. 204. sp. 65 (1876).

Macropygia phasianella, part., G. R. Gr. (nec Temm.), P. Z. S. 1858, p. 187, Aru Islands only; Wall. Ibis, 1865, p. 389. sp. 81 (partim).

[No. 254. Wokan, female.—*J. M.*]

38. *MEGAPODIUS DUPERREYI*, Less. & Garn.

Megapodius duperreyi, Less. & Garn. Bull. Sc. Nat. viii. p. 113 (1826), Dorey (type examined); Less. Voy. Coq. Zool. i. pt. 2, p. 700, 703, pl. 36 (1826–1828).

Megapode reinwardt, Temm. Pl. Col. livr. 37, genre *Megapode* (1823).

Megapodius rubripes, Temm. Pl. Col. 411 (25th October 1826¹), Celebes! Amboyna!

Megapodius reinwardtii (sic), Temm. apud Wagl. Syst. Av. Gen. *Megapodius*, note (1827), descr. nulla.

Megapodius reinwardtii, Wagl. Syst. Av. Gen. *Megapodius*, Ad-ditamenta, sp. 4 (1827).

Megapodius rufipes, S. Müll., Verh. Land- en Volkenk. pp. 23, 109 (1839–1844), Utanata.

Megapodius, sp., Wall. Ann. & Mag. Nat. Hist. (2) xx. pp. 473, 477 (1857), Ké, Aru.

[No. 230. Female: eyes dull red; legs orange; bill horn-colour.—*J. M.*]

A female (No. 230) from Wokan.

39. *NUMENIUS UROPYGIALIS*, Gould.

[No. 258. Wanumbai, male.—*J. M.*]

40. *TRINGOIDES HYPOLEUCUS* (Linn.).

[No. 227. Dobbo, female: legs light green; bill dark green; eyes hazel; stomach contained insects.—*J. M.*]

7. On the Systematic Position of the Momotidæ.

By A. H. GARROD, M.A., F.R.S., Prosector to the Society.

[Received December 3, 1877.]

In my paper on certain muscles of birds and their value in classification², I have made an error, which I desire to correct, with reference to the systematic position of the Momotidæ. I there included them with the Coraciidæ as part of a single family, characterized among the Anomalogonatae by the possession of a nude oil-gland, together with colic cæca. Since the time my paper appeared, I have had the opportunity of dissecting several species of Momotidæ, thanks to the kindness of Mr. O. Salvin, including *Momotus lessoni*, *M. æquatorialis*, *M. brasiliensis* (a specimen which had lived in the Society's Gardens), *Hylomanes gularis*, and *Eumomota superciliaris*; and I find that in none of these are colic cæca present.

Further, in *Hylomanes gularis* and *Eumomota superciliaris* I find

¹ I doubt whether this date, given by Crotch (Ibis, 1868, p. 500), for the publication of the 69th livraison of Temminck's 'Planches Coloriées,' is exact; my doubts rise from the fact that *M. rubripes* is not mentioned by Wagler in his 'Systema Avium,' published in 1827.

² P. Z. S. 1874, p. 123.

a minute tuft on the apex of the oil-gland, although in the several species of *Momotus* there is no trace of any tuft; in fact they have lost it, evidently since the family was differentiated off.

Such being the case, the Momotidæ must be placed with the Pici-formes, as defined by me, instead of with the Passeriformes; and the amended arrangement may be thus tabulated, the Todidæ and Momotidæ almost certainly forming a single family, as has been suggested by many, and which is confirmed by the observation made by Dr. Murie that in the Todidæ the beak is serrate¹.

ANOMALOGONATÆ.

Aves Piciformes.

- Bucerotidæ.
- Alcedinidæ.
- { Momotidæ.
- { Todidæ.
- { Ramphastidæ.
- { Capitonidæ.
- { Pici.

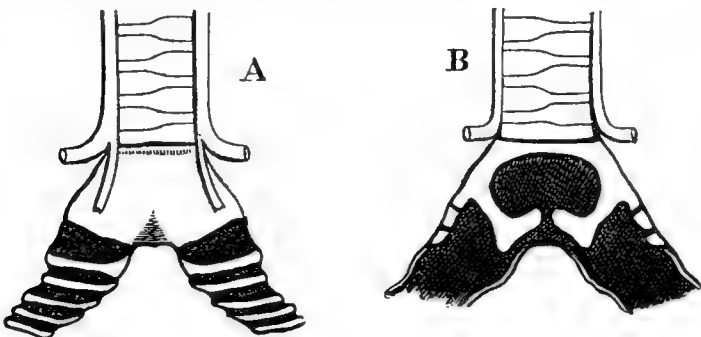
Aves Passeriformes.

- Coraciidæ.
- Steatornithidæ.
- Caprimulgidæ.
- Galbulidæ.
- Meropidæ.
- Trogonidæ.
- Bucconidæ (?).
- Passeres.

In further favour of the inclusion of the Momotidæ with the Pici-formes may be mentioned the pterylographic peculiarity found in them all, namely that the outer pectoral branch of the inferior tract is separated almost entirely from the inner branch, with which it blends for nearly its whole distance, or entirely, in the Passeriformes.

From a skin, I have been able to determine that the deep flexor tendons of the leg of *Todus viridis* are arranged on exactly the same plan in it as in the Momotidæ², and that its tensor patagii brevis also terminates in exactly the same manner as it does in them³.

The syrinx of the Momotidæ has never been fully described, so far as I am aware. I therefore exhibit a figure of it as it appears in



Syrinx of *Momotus lessoni*.

Momotus lessoni, which resembles that of the other species which I have examined. Fig. A is the anterior view; B, the posterior.

¹ P. Z. S. 1872, p. 671.

² Vide P. Z. S. 1875, p. 344.

³ Vide P. Z. S. 1876, p. 511.

The large cartilaginous three-way piece, in which the trachea terminates inferiorly, is compound, being formed of several fixed rings. It is complete in front, being represented behind by a hooked process on either side, extending inwards towards the middle line, where the two nearly meet. The lateral muscles of the trachea extend down to the upper margin of this peculiar syrinx; and a few of their anterior fibres continue onwards to the surface of the cartilaginous box, where they terminate, sometimes higher and sometimes lower, but always before reaching its inferior margin.

8. Note on the Gizzard and other Organs of *Carpophaga latrans*. By A. H. GARROD, M.A., F.R.S., Prosector to the Society.

[Received December 3, 1877.]

In the collection of birds preserved in spirit by H.M.S. 'Challenger' is the body, after the skin had been removed, of a single specimen of *Carpophaga latrans*, together with the gizzard of a second individual of the same species, obtained at Kandavu, Fiji. These form the material for the present communication.

In his note-book Mr. John Murray makes the following remarks on the species¹:—"Stomach contained the fruit of some tree unknown to me. The coat of the stomach had hard papilla-like ossifications of a circular form, two or three rows. . . . These indurations are composed of a horny substance"—from which it is seen that Mr. Murray was the first to recognize the existence of the strange arrangement to be here described.

The thin-walled and capacious crop contained only one thing in its interior—a complete fruit, which has been identified for me by Mr. W. T. Thiselton Dyer, as that of *Oncocarpus vitiensis*. In the gizzard was also found a portion of a second example of the same fruit.

Oncocarpus vitiensis is a tree belonging to the natural order Anacardiaceæ, which, according to Dr. Seemann², is "about sixty feet high, bearing large oblong leaves and a very curious corky fruit, somewhat resembling the seed of a walnut." The tree is included among those which are poisonous by the Fijians; and its sap produces an intense itching of the skin, when brought into contact with it, whence the native name Kau Karo or itch-wood.

For the crushing of this very hard fruit a special anatomical modification of the gizzard-walls of this Fruit-pigeon is developed, which is peculiarly interesting and tends to prove the plasticity of organs when aberrant forces come into play.

The gizzard is not developed to any thing like the extent that it is

¹ Vide P. Z. S. 1877, p. 737.

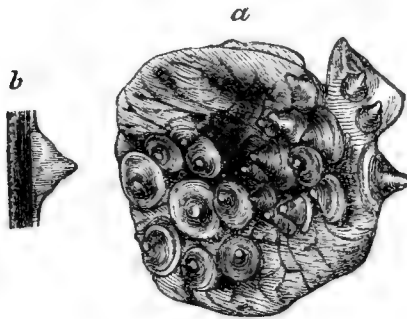
² Seemann's Mission to Viti, p. 334.

in the Gallinæ or Anseres, but, as in most Carpophagine birds, is small, and has its muscular walls comparatively ill-developed. No stones of any kind were found in it.

It is the epithelial lining which is so peculiar in *Carpophaga latrans*. Instead of being smooth, or folded into plications, as is usually the case, its surface is raised into horny cones which closely resemble in appearance the tubercles for the attachment of the spines of the Echinoderm genus *Cidaris*. In fig. 1, *a*, the interior of the gizzard is represented; fig. 1, *b*, is a section of one of the cones resting upon the muscular gizzard-wall.

These conical processes are corneous throughout, are erect, and are quite transparent when cut into sections. There are twenty-

Fig. 1.



Interior of the gizzard of *Carpophaga latrans*.

three of them, large and small, in each of my specimens. The larger cones, which are the more numerous, average seven millimetres in diameter at their bases, their axial length being about four millimetres; the smallest cone is four millimetres across and of nearly the same height.

The cones are arranged, close to one another, in a fairly regular manner upon the two muscle-masses, being distributed in rows of three, counting either transversely or longitudinally. This disposes of eighteen of the twenty-three cones. The remaining five are found on the tendinous intermuscular walls of the organ, in longitudinal rows, two in one row, three in the other.

A section of any one of the cones demonstrates that it is not in the least ossified, but corneous throughout, and of about the density of ox-horn. It is also seen that the attached surface of the epithelium does not participate in the undulations of the free surface, being quite smooth. Neither does it send any processes into the cones. Between the cones the epithelium is yielding, and only semicorneous.

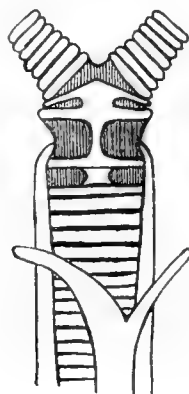
A still further exaggeration of this abnormal condition of the epithelium of the gizzard of *Carpophaga latrans* has been described

by MM. Jules Verreaux and O. Des Murs in *Phænorhina goliath*¹ of New Caledonia, which “se nourrit de graines de *semicarpum*.” In this bird “le gésier, déjà on ne peut plus musculeux par lui-même, a sa surface intérieure régulièrement recouverte . . . de pointes véritablement osseuses, rappelant la forme de celles qui se voient à la surface du corps de la *Raia* bouclée, ou *Clavel*, ou *Clavelade*. Ces pointes, en cône aplati, ont leur base plane de 5 millim. de diamètre, d’une hauteur de 5 à 6 mill., sont légèrement inclinées sur elles-mêmes, et quelquefois recourbées par la dessiccation, l’extrémité en étant mousse.” A central fibrous peduncle is also said to run through each osseous element.

Phænorhina goliath, from what has been said above, therefore differs from *Carpophaga latrans* in having the cones of the gizzard proportionally longer, at the same time that they are ossified (which necessitates the presence of vessels in the ossification, which appear after death as the fibrous cord) and oblique. There is, however, a great similarity between the two organs.

I am informed by the Rev. S. J. Whitmee that *Carpophaga pacifica* in the Samoan Islands feeds on nutmegs, from which it is highly probable that in that species the gizzard-epithelium is modified in a manner similar to that of the Fiji or New Caledonian species. Specimens of *C. pacifica* preserved would therefore be of special interest for the determination of this point.

Fig. 2.



Syrinx of *Carpophaga latrans*.

With reference to the other parts of *Carpophaga latrans*, the intestine is very capacious, only nine inches long, and transversely sacculated from the contraction of its outer longitudinal muscular coat, this producing the appearance of thirty bold transverse folds on the mucous surface. There are no colic cæca; and, as in the genus *Carpophaga* generally², the gall-bladder is well developed. The liver-lobes are equal in size.

¹ Revue et Magasin de Zoologie, 1862. p. 168. ² Vide P. Z. S. 1874, p. 258.

The syrinx (fig. 2, p. 104) is Columbine, with its lateral muscles attached inferiorly to the membrane between the penultimate and antepenultimate tracheal rings. The trachea is composed of rings which are very yielding in the middle line posteriorly. As can be seen in the figure, the muscoli sterno-tracheales, which are independent of the intrinsic muscles, are not quite symmetrically attached.

The furcula, as is the rule in the subfamily, is very slender, but complete, wherein this species differs from *Phænorhina goliath*, in which it is cartilaginous at its symphysial end, according to MM. Verreaux and Des Murs¹.

Myologically, the ambiens is to be found, not large; the femoro-caudal with its accessory head are well developed; the semitendinosus and its accessorius are the same.

There are two carotids; so that in this as well as all the other features above mentioned *Carpophaga latrans* agrees with my definition of the division of the Columbidae into which it naturally falls, its gizzard differing, however, from that of all but one of the species which have been examined.

9. Description of a new Species of *Helix* from Japan.

By EDGAR A. SMITH, F.Z.S.

[Received December 4, 1877.]

HELIX (CAMENA) CONGENER, n. sp.

Testa convexiusculo-orbiculata, spira breviter conica, subaperte umbilicata, tenuis, sordide pallido-virescenti-albida, fasciis tribus nigrofuscis, media latissima, infima umbilicum pingente; anfractus 5½, convexiusculi, lineis incrementi obliquis flexuosis, striisque spiralibus confertis insculpti, ultimus subtus satis convexus, prope aperturam leviter breviterque descendens; apertura perobliqua, semilunaris, intus fasciata; peristoma tenue, roseum vel lilaceum, marginibus conniventibus, supero breviter expanso, basali et columellari latius reflexis.

Diam. max. 30 mill., min. 25, alt. 18; aperturæ long. 15, lat. 14.

As this form approaches very closely to *H. peliomphala* of Pfeiffer, I will give a comparative description as the best means of showing its distinctness.

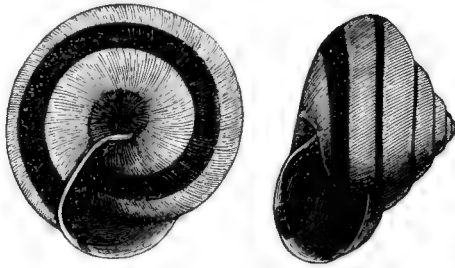
It is uniformly smaller, more narrowly umbilicated and of a paler ground-colour; its spire is constantly more elevated, aperture smaller; the banding in the fourteen specimens examined invariably follows the same arrangement, and not one of them exhibits any trace of the opaque yellow stripes or blotches which are almost invariably observable in a greater or less degree (on the bands most conspicuously) in *H. peliomphala*.

This is a very pretty, delicate species, and of a thin semitransparent texture. On the front of body-whorl, about two thirds of its whole extent from the lip, there is an oblique strongly marked line which is

¹ *Loc. cit.* p. 140.

suffused with a pinkish tint, evidently marking a period of cessation of growth, the colour having stained that part of the shell which then formed the lip of the aperture.

The uppermost dark band of the last whorl is situated a little above the middle, and passes just above the suture, and can be traced in part almost to the apical whorl. Adjoining this thin line there is a second thread-like one which borders the sutural edge of the whorls. The median band is very broad, frequently more than twice as wide as that above it, and encircles the whorl somewhat below the periphery; and the basal one, equally broad with the preceding, winds around the rounded margin of the umbilicus.



Helix (Camaena) congener.

Other allied forms of this species are *H. luhuana*, Sowerby, which seems to be distinct from *H. peliomphala*, *H. simodæ*, Jay, and *H. herklotsi*, Martens.

Whether these five are good and distinct species or only local forms of one and the same, of which intermediate gradations have not yet been observed, remains yet to be ascertained; but, so far as our present knowledge extends, the differences of form, texture, banding, &c., warrant the presumption that they are specifically distinct.

The series of specimens upon which the above description is based has been kindly placed in my hands for examination by Mr. G. B. Sowerby, junior, who has presented two of them to the national collection.

10. Contributions to the Ornithology of the Philippines.—
No. IV. On the Collection made by Mr. A. H. Everett
in the Islands of Dinagat, Bazol, Nipah, and Sakuyok.
By ARTHUR, Marquis of TWEEDDALE, F.R.S., President
of the Society.

[Received December 11, 1877.]

(Plates VI.—VIII.)

The four islands in which Mr. Everett collected the birds of which I propose to give an account are situated to the north of the



J. Smit lith

Hanhart imp.

CEYX ARGENTATA





J. Gmel. del.

H. Gmel. sculp.

1 HYPOTHYMIS CÆLESTIS
2 MIXORNIS CAPITALIS





J. Smit Neth

Hanhart imp

- 1 DICÆUM SCHISTACEUM
- 2 DICÆUM EVERETTI
- 3 PRIONOCHILUS OLIVACEUS



shores of Mindanao, and are only separated from that island by narrow channels. Through these channels the wind blows with considerable force throughout the greater part of the year, being either the gales of the S.W. or the N.E. monsoon.

Mr. Everett's observations on the ornithological features of these islands, coming as they do from a personal observer, merit transcription. He writes:—"No district visited so far has equalled the vicinity of Manilla in the number and variety of its birds. The progress of the work shows that a very close general similarity exists between the islands of Mindanao and Luzon, though there are some marked local differences. This was to be expected; and it is rather surprising that the differences are as marked as they are, when we consider that not only are the islands separated from another by very narrow spaces of sea, but that they are situated in an area where strong winds blow in various directions, with little cessation during the major part of the year, accompanied with violent squalls and typhoons, so that any high degree of specialization in the local avifauna would seem, *à priori*, out of the question."

In the island of Dinagat, Mr. Everett writes, he found birds to be excessively rare; still he obtained 39 species, 7 of which were undescribed:—

Ceyx argentata.

Hypothymis celestis.

Mixornis capitalis.

Dicaeum schistaceum.

Dicaeum everetti.

Prionochilus olivaceus.

Æthopyga dubia.

Only 13 species were obtained in the small islands of Nipah, Bazol, and Sakuyok; and they are all known inhabitants of Mindanao.

1. CACATUA HÆMATUROPYGIA (1).

[Nipah, ♀, July.]

2. LORICULUS HARTLAUBI (7).

[a. Dinagat, ♂, ♀, June. b. Bazol, ♂, July.]

The example figured, P. Z. S. 1877, p. 819 (♂), is in full adult plumage, the occipital feathers being orange-red, grading into orange on the nape, which colour suffuses and descends the back, losing itself in the pure green of the lower back. There is no blue about the face, chin, or throat; the dark blue of the under surface of the rectrices fades into pale blue at their apices. The orange hue on the back of the female figured is less intense.

3. HARPACTES ARDENS (34).

[Dinagat, ♂, June. Iris brown; bill yellow, base green.]

A single example, in adult plumage, and which has a more massive bill than is found in Luzon individuals. Otherwise alike, and dimensions equal.

4. MEROPS PHILIPPINUS (35).

[Bazol, ♂, July.]

5. EURYSTOMUS ORIENTALIS (37).

[*a.* Dinagat, ♂, June. *b.* Nipah, ♀, July.]

6. PELARGOPSIS GIGANTEA.

Pelargopsis gigantea, Walden, Ann. & Mag. Nat. Hist. (4) xiii. p. 123, P. Z. S. 1877, pp. 541, 822.

[Dinagat, ♀, ♂, June.]

Neither example in full plumage; and both are not separable from the Butuan male observed upon *l. c.* Butuan, Pasananca, Malanipa, and these Dinagat individuals appear to belong to a small race of *P. gigantea*.

7. CEYX ARGENTATA. (Plate VI.)

Ceyx argentata, Tweeddale, Ann. & Mag. Nat. Hist. (4) xx. p. 533, ♀ (1 December 1877).

[Dinagat, ♀, June. Iris brown; bill black; feet pale reddish.]

♀. Chin, throat, upper breast, abdomen, ventral region, major under wing-coverts, and thigh-coverts pure white. Cheeks, sides of head, and ear-coverts black. Lower breast and flanks black, washed with deep blue. Rectrices and under tail-coverts black. Plumage above black; a bold supercilium commencing above the eye and running into the occipital crest, formed by the component plumes being tipped with pale silvery blue; many of the feathers of the vertex minutely tipped with silvery blue. Occipital crest tipped with pale silvery bluish green, or silvery blue, or the two together. Dorsal plumage and lengthened upper tail-coverts black at base, then silvery bluish green, then pale silvery blue. Wings black. Major coverts each with a terminal silvery-green spot. Loral spot white; an isolated tuft on the sides of neck, white tipped with creamy fulvous. Bill black.

Wing 2·62 inches, tail 1·37, tarsus 0·45, culmen 1·50.

8. SAUROPATIS CHLORIS (47).

[Dinagat, ♀, June.]

9. PYRRHOCENTOR MELANOPS (65).

[Nipah, ♀, July.]

10. PENELOPIDES AFFINIS.

Penelopides affinis, Tweeddale, Ann. & Mag. Nat. Hist. (4) xx. p. 534; P. Z. S. 1877, p. 824.

[Dinagat, ♂, June: iris crimson. *a.* ♀, June: iris rather dark brown-orange.]

11. GRAUCALUS STRIATUS (74).

[Nipah, ♂, ♀, July: iris Naples-yellow.]

12. LALAGE DOMINICA (76).

[Dinagat, ♂, ♀, June.]

13. *HYLOTERPE PHILIPPINENSIS* (78).

[Dinagat, ♂, June; ♀: iris dark brown; bill black; legs bluish grey.]

Sexes alike—not to be distinguished from the type.

14. *DICRURUS STRIATUS*.

Dicrurus striatus, Tweeddale, P. Z. S. 1877, p. 545, no. 20.

[Nipah, ♂, July.]

15. *LEUCOCERCA NIGRITORQUIS* (83).

[Dinagat, ♀, June.]

16. *CYORNIS PHILIPPINENSIS*.

Cyornis philippinensis, Sharpe, Tr. Linn. Soc. ser. 2, Zool. i. p. 325, "Panay" (1876).

[Dinagat, ♂, June.]

A single example, hardly separable from Zebu individuals, and agreeing with them in dimensions, consequently larger than Luzon and North-Mindanao specimens. Wing 3·66 inches, as against 2·95; tail, 3·00, as against 2·75.

17. *HYPOTHYMIS CÆLESTIS*. (Plate VII. fig. 1.)

Hypothymis cælestis, Tweeddale, Ann. & Mag. Nat. Hist. (4) xx. p. 536, ♀ (1 Dec. 1877).

[Dinagat, ♀, June: iris dark-brown; bill blue tipped and margined black; interior of gape yellow-green; orbital ring light green; legs grey blue.]

♀. Azure. Feathers of the head grey at their insertion, and each tipped with glistening azure; a lengthened occipital crest similarly marked. Space before the eye and lores pale blue. Chin, cheeks, throat, sides of neck, and upper breast rich velvety turquoise-blue, darker than the blues of the rest of the plumage. Back and upper tail-coverts with grey bases to the feathers, the extremities being blue, which is paler on the upper tail-coverts. Wing-coverts of the same shade of blue as the head. Quills dark brown externally, margined with a paler shade of blue. Lower breast, abdomen, vent, flanks, and under tail-coverts white, tinged with pale greenish blue, most intense on the flanks. Axillaries grey, tinged with pale blue. Rectrices above like the quills; underneath dark brown like under surface of the quills. Shafts of the rectrices brown above, almost white underneath. Shoulder-edge blue.

Wing 2·82 inches, tail 3·00, tarsus 0·62, culmen 0·56.

A form nearly allied to *H. azurea*, but differing in its lengthened crest, its paler tints of blue, and in the absence of any black markings. The blue shade of the throat and upper breast is about equal in tint to that of the predominant colour of the older known species.

18. *HIRUNDO JAVANICA*.

Hirundo javanica, Sparrm., Mus. Carls. fasc. iv. t. 100 (1789).

[Dinagat, ♂, June.]

19. *SARCOPHANOPS STEERII*.

Eurylæmus steerii, Sharpe, 'Nature,' vol. xiv. p. 297. "Basilan."

Sarcophanops steerii, Sharpe, Tr. L. S. ser. 2, Zool. i. p. 344, t. liv.

[Dinagat, ♀, June: iris brilliant sap-green; bill, orbital skin, and legs fine blue, paler on the tarsal scales; nails light grey.]

20. *BRODERIPUS ACRORHYNCHUS* (90).

[Dinagat, ♂, June.]

21. *MIXORNIS CAPITALIS*. (Plate VII. fig. 2.)

Mixornis capitalis, Tweeddale, Ann. & Mag. Nat. Hist. ser. 4, xx. p. 535 (Dec. 1, 1877).

[Dinagat, ♀, June: iris orange; bill blackish grey; legs greenish lead-grey; soles and nails ochreous yellow.]

♀. Forehead, vertex, and occiput rufous, each feather with a pale fulvous central streak. Space before the eyes and lores dull grey. Cheeks, ear-coverts, and sides of neck ashy, each feather with a pale albescent central streak. Nape, back, and wing-coverts the same, the pale striations on the back being very prominent in consequence of the abnormal length of the dorsal plumage. Uropygium and upper tail-coverts olive rusty grey and unstriated. Rectrices brown; outer pair with the whole outer and apical third of the inner web pale yellowish white; remaining pairs, middle excepted, broadly tipped on both webs with white, middle pairs slightly tipped with white. All the quills brown, narrowly margined externally with fulvous grey, the tertiaries with pale rusty. Basal portion of quills margined on their inner webs with white. Chin and throat rufous and rufous-white. Breast, under wing-coverts, abdomen, vent, and under tail-coverts white, faintly tinged with very pale yellow.

Wing 2·75 inches, tail 2·50, tarsus 0·70, culmen 0·62.

22. *MACRONUS STRIATICEPS*.

Macronus striaticeps, Sharpe, Tr. L. S. ser. 2, Zool. i. p. 331, "Basilan" (1876).

[Dinagat, ♀: iris white.]

The type specimen is not quite so rufous below, otherwise identical.

23. *IXUS GOIAVIER* (99).

[Nipah, ♀, pairing, July.]

24. *POLIOLOPHUS UROSTICTUS* (101).

[Dinagat, ♂, June: orbital ring lemon-yellow. b, ♀, June.]

Sexes alike.

25. *CRINIGER EVERETTI*.

Criniger everetti, Tweeddale, Ann. & Mag. Nat. Hist. ser. 4, vol. xx. p. 535, et P. Z. S. 1877, p. 827, pl. lxxxiv.

[Dinagat, ♂, ♀, June.]

26. *ORTHOTOMUS FRONTALIS*.

Orthotomus frontalis, Sharpe, Ibis, 1877, p. 112, t. ii. f. i.; Tr. L. S. (2) Zool. i. p. p. 336.

[Dinagat, ♂, ♀, June.]

27. *ZOSTEROPS EVERETTI*.

Zosterops everetti, Tweeddale, P. Z. S. 1877, pp. 762, 829.

[Dinagat, ♂, June: iris yellowish brown; bill blackish; legs pale grey. ♀, June.]

Dinagat, North-Mindanao, and Zebu birds do not differ.

28. *DICÆUM RUBRIVENTER* (120 *partim*).

Dicæum rubriventer, Lesson, Tr. p. 303; Tweeddale, P. Z. S. 1877, p. 763.

[Dinagat, ♂, June.]

The Dinagat birds in no respect differ from Luzon, Zebu and North-Mindanao examples.

29. *DICÆUM SCHISTACEUM*. (Plate VIII. fig. 1.)

Dicæum schistaceum, Tweeddale, Ann. & Mag. Nat. Hist. ser. 4, vol. xx. p. 537 (December 1, 1877).

[Dinagat, ♂, June.]

♂. Above fuliginous ashy; below ashy white. Remiges and rectrices above dark ashy brown, underneath paler. Under wing-coverts and axillaries pure white. Base of mandible (in dry specimens) yellowish white. Apex and the maxilla pale ruddy brown.

Wing 2·25 inches, tail 1·37, tarsus 0·62, culmen 0·35.

A large species with a short stout bill.

30. *DICÆUM EVERETTI*. (Plate VIII. fig. 2.)

Dicæum everetti, Tweeddale, Ann. & Mag. Nat. Hist. ser. 4, vol. xx. p. 537 (December 1, 1877).

[Dinagat, ♂, June: iris greyish brown; bill brown, base orange; legs light grey.]

♂. Above dark olive-green, paler on the cheeks. Chin, throat, and breast pale grey. Remainder of underparts albescent grey tinged with palish yellow. Major coverts narrowly margined with greenish yellow. Quills above dark brown, almost black, with very narrow pale olive-green external margins. Rectrices above like the quills, narrowly tipped with albescent fringe. Under wing-coverts and axillaries pure white. Bill (dry specimen) brown at tip, yellow at base.

Wing 1·94 inch, tail 1·00, tarsus 0·50, culmen 0·37.

31. *PRIONOCHILUS OLIVACEUS*. (Plate VIII. fig. 3.)

Prionochilus olivaceus, Tweeddale, Ann. & Mag. Nat. Hist. ser. 4, vol. xx. p. 536 (December 1, 1877).

[Dinagat, ♀, June: iris sienna-brown; bill grey-black, base of mandible paler; legs light grey.]

♀. Entire upper surface, wing-coverts, and surface of closed wing uniform pure olive-green, which colour encircles the eye and covers the sides of the neck. Space before the eye, cheeks, sides of throat, and the upper breast grey. Lower breast, abdomen, flanks, and under tail-coverts the same grey washed faintly with olive-green, the mesial line being albescent. Chin and throat white, slightly greyish, forming a broad well-defined greyish white stripe, commencing at the chin and descending to the breast. Axillaries and under wing-coverts pure silky white. Remiges and rectrices dark brown, margined with the olive-green hue of upper plumage.

Wing 2·12 inches, tail 1·25, tarsus 0·62, culmen 0·37.

Since I described this species (*l. c.*) I have received the male, which in no way differs.

32. NECTAROPHILA SPERATA (122).

[Dinagat, ♂, June; *b*, ♀: iris brown; bill very dark brown; legs black. *c*, June: iris dark brown; bill black, mandible brown; legs black. *d*, ♂ (juv.), June: iris dark brown. *e*, Nipah, ♂, July.]

I cannot separate example *d* (♂ juv.) from examples *b* and *c* (♀). A slight supercilium, chin, throat, cheeks, and whole lower surface pale uniform greenish-yellow, above olive-green. They differ from a supposed female, ex Surigao, described (P. Z. S. 1877, p. 830) by having the chin, throat, and cheeks uniformly coloured with the breast and abdomen, but agree in the ruddy colouring of the wing when closed. A fourth example (sex not stated on label) is undistinguishable from the Surigao female previously described (*l. c.*).

33. ARACHNECHTHRA JUGULARIS (123).

[Dinagat, ♀, June.]

* 34. ÆTHOPYGA DUBIA, n. sp.

[Dinagat, ♂, June: iris yellow-brown; bill brown; legs dark grey; feet ochreous. *b*, ♂, June: bill and legs very dark brown. *c*, ♀, June: iris bright Indian-red; bill black; legs light brown.]

♂ (juv.?). Above, wing-coverts, and exposed surface of quills olive-green. Uropygium bright sulphur-yellow, forming a broad yellow band. Rectrices black, edged with olive; laterals tipped with pale yellow-olive. Feathers of the lower surface ashy at their base, and all tipped pale yellow; lores the same; cheeks rather albescent-ashy. Under wing-coverts white; carpal edge very pale yellow. Quills dark brown.

♀. Like the male above described.

	Wing.	Tail.	Tarsus.	Culmen.
♂	1·82	1·12	0·62	0·75
♀	1·80	1·00	0·62	0·75

The three examples on which this species is founded are difficult to distinguish, by their plumage alone, from *Æ. bella* ♀ vel ♂

juv. ; but the dimensions are considerably greater :—culmen 0·75, as against 0·50 ; wing 1·80, as against 1·62. Doubtless the adult male will closely resemble that of *Æ. bella*.

35. *ANTHOTHREPTUS GRISEIGULARIS*.

Anthothreptus griseigularis, Tweeddale, P. Z. S. 1877, p. 830.

[Sakuyok, ♂, July.]

36. *RHABDORNIS MYSTACALIS* (124).

[*a.* Dinagat, ♂, June : iris crimson ; bill black. *b.* ♂ : legs yellowish brown. *c.* ♂ : legs dark grey.]

The only female in a series of seven examples wears the same dress as the males. Luzon individuals do not differ.

37. *CORVUS PHILIPPINUS* (125).

[Dinagat, ♂, ♀.]

Female smaller than male.

38. *CALORNIS PANAYENSIS* (128).

[*a.* Nipah, ♂, ♀, July. *b.* Sakuyok, ♀, July.]

39. *SARCOPS CALVUS* (129).

[Dinagat, ♂, June.]

40. *OSMOTRERON AXILLARIS* (136).

[Dinagat.]

A single example (♂), which cannot be separated from typical individuals.

41. *PHABOTRERON AMETHYSTINA* (139).

[Dinagat, ♀, June : iris yellowish brown.]

This, Luzon, and N. Mindanao (Butuan) examples do not differ.

42. *PHABOTRERON BREVIROSTRIS*.

Phabotreron brevirostris, Tweeddale, P. Z. S. 1877, p. 549.

[Dinagat, ♀, May.]

Undistinguishable from N. and S.W. Mindanao examples.

43. *CARPOPHAGA ÆNEA* (141).

[Dinagat.]

44. *MYRISTICIVORA BICOLOR* (143).

[*a.* Nipah, ♀, July : iris dark brown ; bill blackish blue ; feet light lead blue. *b.* Sakuyok, ♂, July.]

45. *HEMIPHAGA POLIOCEPHALA* (144).

[Dinagat, ♀, June. Iris Indian-yellow, passing into red on outer circumference ; orbital ring and patch crimson ; bill black ; feet carmine ; nails dark grey.]

46. ORTYGOMETRA CINEREA (172).

[Dinagat, ♀, June : iris crimson.]

47. HYPOTÆNIDIA TORQUATA (177).

[Dinagat, ♀, June.]

48. BUTORIDES JAVANICA (197).

[*a.* Dinagat, ♀ ; *b.* Nipah, ♂ ♀, July : iris bright yellow ; legs bright chrome-yellow.]

No date on label of Dinagat example, but killed in June.

49. DYSPOURUS SULA (214).

[Dinagat, ♂, June : iris white ; feet light leaden-green ; bill whitish green.]

In full white and rich brown plumage. Wing 15·30, tail 10·00, culmen 3·90, tarsus 1·60.

11. On a new Philippine Genus and Species of Bird. By ARTHUR, Marquis of TWEEDDALE, F.R.S., President of the Society.

[Received December 12, 1877.]

(Plate IX.)

Until Dr. Steere some three years ago discovered in the island of Basilan two species¹ belonging to the *Timeliidæ*, this natural family, so characteristic of the Indian region, was supposed to be unrepresented in the Philippines. Since then Mr. Everett has discovered a third species² in the island of Dinagat, and a fourth, the subject of this note, in the island of Negros. This last bird is so anomalous in its structure that I propose to constitute it the type of a new genus,

DASYCROTAPHA³.

Base of maxilla densely clothed with short feathers, space behind the eye naked. Bill about the length of head, and formed as in *Mixornis*. Wing lengthened, longer than tail, first primary half the length of the second, which is a fifth shorter than the third, third a little shorter than the fourth, which is equal to fifth and sixth. Tail moderate and square. Tarsus strong ; hallux with claw stout and long ; digits short, slender ; outer a little shorter than inner.

DASYCROTAPHA SPECIOSA, sp. nov. (Plate IX.).

Head crested ; forehead with dense short plumes covering the base of the maxilla ; circle round the eye, whole space before the eye, tuft on the side of the base of mandible, chin and uppermost

¹ *Macronus striaticeps*, Sharpe, and *Dendrobiastes basilanica*, Sharpe.² *Mixornis capitalis*, Tweeddale.³ *δασύς, villosus, et κρόταφοι, tempora capitis.*



J. Smit lith.

Hanhart imp.

DASYCROTAPHA SPECIOSA.

1911
NATURAL HISTORY

part of throat pure lemon-yellow; crown of the head black; postoccipital plumes yellow; nape yellowish green tipped with black; a lengthened tuft of plumes springing from above the eye bright orange; a line immediately below this tuft black; a tuft of stiff decomposed feathers springing from below the eye and extending over the ears white or greyish white; an irregular band across the throat black; dorsal feathers grey with light olive-green tips and white shafts; uropygium yellowish green; upper tail-coverts the same, tinged with rufous; lower throat and upper breast bright yellow, most of the feathers with black terminal drops; lower breast and rest of under plumage duller yellow tinged with green on the flanks; quills brown margined with yellowish olive-green, inner margin of quills pale yellow; wing-coverts dull olive-green, carpal edge and wing-lining yellow; tail dull rufous.

Wing 2·62, tail 2·37, tarsus 0·87, culmen 0·75.

Hab. Valencia, Island of Negros, ♂, August. Iris crimson; bill orange-yellow. (*Everett.*)

The hereditary affinity of this new form with *Macronus striaticeps* and *Mixornis capitalis* is betrayed by the colouring and markings of the dorsal plumage.

February 5, 1878.

Prof. St. George Mivart., F.R.S., V.P., in the Chair.

The Secretary read the following report on the additions to the Society's Menagerie during the month of January 1878.

The total number of registered additions to the Society's Menagerie during the month of January was 91, of which 43 were by presentation, 1 by birth, 41 by purchase, and 6 were received on deposit. The total number of departures during the same period, by death and removals, was 78.

The most remarkable additions during the month of January were as follows:—

1. A Japanese Wild Dog, presented by Harry Pryer, Esq., of Yokohama, January 1st—an animal apparently allied to the "Dhole" of India and the "Dingo" of Australia. Mr. E. W. Janson has kindly favoured me with the following extracts from two letters which he has received from Mr. Pryer on this subject.

"Yokohama, Oct. 8th, 1877.

"I have sent by the 'Loudoun Castle,' viâ New York, a fine specimen of the Japanese Wild Dog. This is an animal quite new, and is neither a Wolf nor an ordinary Dog. Its principal distinguishing features are its long narrow feet and its head; it most resembles the dog used by the hunters here, one of which is figured in Siebold. Its habits are totally different from those of any domesticated Dog. When pleased it has a most extraordinary way of laughing, and also, when pleased or very angry, has a curious dancing gait. This specimen

was taken a puppy on the slopes of Fujisan last year. I bought him for \$11 in November last. He has learnt a sort of bark from the other dogs which he did not know when I first had him; he comes out sometimes with a regular wolf's howl, but not often. In his muzzle he resembles more the mainland Wolf, the northern Wolf being, like the Siberian one, very long in the nose, and those on the mainland (*C. hodophylax*) much shorter. My first impression was that this dog was a cross between a wolf and the hunter's dog; but both its parents then would have had very large round feet, which this has not. A friend told me that it is very like the Indian Dhole. In winter it has a thick coat; but in summer all the long thin hair comes out, and it then has only its coarse wiry hair on. It is a much scarcer animal than the Wolf on the mainland, which latter is rather common in the mountains, anywhere where the sheep-faced Antelope is found."

"Yokohama, Nov. 17th, 1877.

"I am trying to get a Southern Wolf (*Canis hodophylax*) to send as a present to the Society. I have sent the Wild Dog in the 'Loudoun Castle,' and should like to hear what they say about him. He is a complete puzzle to me. At one time I would look at him and think that he was only an abnormal form of the common Dog, run wild, and at other times feel as perfectly convinced that he had nothing in common with it. He has very narrow feet, clean limbs, very long canines, coarse hair in summer and plenty of long thin hair in the winter, eyes and ears like a Wolf. I heard of the animal wherever I went from the hunters, but only succeeded in getting this one, as they say it is very difficult to catch, more so than the Wolf, the capture of which is no easy task, as I know, as I have been in places where they were plentiful, but only saw one and poisoned another, although I have heard half a dozen at a time howling quite close to me in the forests of Yamato.

"My Wild Dog differs considerably from *C. lupus*, which is found in Yesso, and *C. hodophylax*, which is confined to the Main Island, although in his shorter muzzle he resembles the latter. When we know more about the cave and other recent bone-deposits of Japan, we shall be able to speak more definitely about him."

2. A young Penguin of the genus *Spheniscus*, purchased January 24th. This bird is said to have been obtained in Chili, and is probably the young of *Spheniscus humboldti*. It is very tame, and has been for the present placed in a compartment of the Fish-house, where it seems likely to do well.

Prof. St. George Mivart, F.R.S., read a Memoir entitled, "Notes on the Fins of Elasmobranchs, with Considerations on the Nature and Homologies of Vertebrate Limbs," of which the following is an abstract:—

In this paper I describe (from dissections made for the purpose) the skeleton of the paired and azygos fins, especially the dorsal fins, of *Zygæna malleus*, *Mustelus antarcticus*, *Notidanus cinereus*, *Scyl-*

lium canicula, *Ginglymostoma cirratum*, *Chiloscyllium ocellatum*, *Acanthias blainvillei*, *Spinax niger*, *Pristiophorus japonicus*, *Pristis cuspidatus*, *Rhynchobates djeddensis*, *Trygonorhina fasciata*, and *Callorhynchus antarcticus*; and I add notes made from preparations of *Lamna cornubica*, *Cestracion phillippi*, *Squatina angelus*, *Polyodon foliosus*, and *Polypterus bichir*.

Besides wishing to ascertain the positive conditions of skeletal structures in these forms, the examinations were partly undertaken with a view to the questions:—

(1) What is the nature of Vertebrate limbs generally?

(2) What is the relation of Piscine to other limbs?

To these questions four others are subordinate:—

A. Are the paired-limb structures of a nature distinct from that of azygos fins?

B. Are paired limbs essentially axial structures which have become more or less detached from skeletal axis, or peripheral structures which have become secondarily more or less connected with it?

C. What is the nature of limb-girdles?

D. What is the line of genesis of the cheiropterygium.

I then note and discuss the opinions on these matters of Oken, Carus, Cuvier, Owen, MacIise, Goodsir, Humphrey, Gegenbaur, Macalister, Huxley, Balfour, and Parker.

I have myself arrived at the conclusion that the nature of the paired and azygos limbs is fundamentally the same. I have, in fact, been brought to this conviction by finding various degrees of coalescence between the cartilaginous rays supporting the dorsal fins, and various degrees of connexion or continuity between such fin-supports and the subjacent axial skeleton. I have noted coalescence amongst the rays in *Scyllium canicula*, *Ginglymostoma cirratum*, and especially in *Notidanus cinereus*, where it is carried to such an extent that the rays are supported by one continuous basal cartilage. Continuity with the axial skeleton is described as existing in the dorsal fin-cartilages in several forms, but especially in *Pristis* and *Pristiophorus*; and I would suggest that the lateral pressure of its saw-like rostrum must be more or less aided by very firm fixation to the vertebral column of the cartilages supporting the dorsal fin.

I have found much resemblance between the skeleton of the ventral and the dorsal fins, as, for example, in *Notidanus*, in *Chiloscyllium* and *Raia*; also between the anal and ventral fins, as again in *Notidanus*. But the ventral fin of *Polyodon* is the most striking, presenting as it does a longitudinal double series of simple parallel rays, quite like the simplest form of the skeleton of the dorsal fins. Now, as the ventral and pectoral fins are admitted on all hands to be of the same nature, if the ventrals are of the same nature with the azygos fins, the pectoral ones must be also of that same nature.

As to the objection which may be drawn from the attachment of the pectoral fins to the axial skeleton by a shoulder-girdle instead of by a direct continuous longitudinal adhesion, as in some dorsal fins, I observe:—(1) The pectoral-fin support could not continuously adhere to the axial skeleton longitudinally without impeding the flexure of

the body in swimming; (2) the pectoral fins join the body at too low a level to abut directly on the vertebral column; (3) such direct connexion is prevented by the existence of the body-cavity.

I believe that the limb-girdles are lateral ingrowths from the paired-fin skeleton (an idea already suggested by Mr. J. K. Thacher of New Haven); and I believe such skeleton is the modified remnant of a longitudinal series of similar rays formed primitively in a continuous longitudinal lateral fold.

Similarly, I believe that the skeleton of the azygos fins is a structure also formed primitively in a continuous median fold, and that the dorsal rays are not outgrowths from the vertebral column. If, however, neural spines are homologous with the cartilaginous rays of dorsal fins, then it seems to follow that the spinous processes of higher animals and of man are essentially exoskeletal parts which have adhered to, and grown to be connate with the axial skeleton.

As to the caudal fin, I note a constant difference both as to the number and form of the skeletal parts of its dorsal and ventral portions, seeming to point to some genetic difference needing investigation.

I then proceed to the question of the homologies of piscine and digit-bearing limbs, adopting the view that the preaxial margin of the pectoral fin is that turned obliquely dorsad,—a matter which seems established by its innervation, apart from other proof.

I oppose the view which adopts the *Ceratodus* type of limb as the representative of the archipterygium (Elasmobranch ventrals certainly lend no vestige of support to the theory), and then consider and criticise the successive modifications of opinion expressed by Gegenbaur and Huxley.

I regard some Rays as having pectorals hypertrophied indeed, yet most like the true archipterygium (*i. e.* the least-modified by coalescence) of all Elasmobranch pectorals. As to Teleosteans, not only do I think with Günther that the arrangement of the limb-skeleton of *Ceratodus* is foreshadowed in the pectoral fin of *Acipenser*, but I think it probable that the Teleostean form of limb as seen in *Anguilla* and *Blennius* affords us indications of a very primitive type, whence the pectorals of Teleosteans on the one hand and of Elasmobranchs on the other may both have been derived.

I cannot think that the metapterygium has developed into the limb-axis of the digit-bearing limb; I believe such axis to be rather derived from the mesopterygium, or (as this is sometimes absent, as in *Chiloscyllium*, or imperfect as in *Polypterus*) from the propterygium.

The conclusions I have arrived at as to the probable genesis of Vertebrate limbs are as follows:—

(1) Two continuous lateral longitudinal folds were developed similar to dorsal and ventral median longitudinal folds.

(2) Separate, narrow, solid supports in longitudinal series, and with their long axes directed more or less outwards at right angles with the long axis of the body, were developed in varying extents in all these four longitudinal folds.

(3) The longitudinal folds became interrupted variously, the

lateral fold so as to form two prominences on each side, *i. e.* the primitive paired limbs.

(4) Each anterior limb increased in size more rapidly than the posterior limb.

(5) The bases of the cartilaginous supports coalesced as was needed according to the respective practical needs of the different separate portions of the longitudinal folds, *i. e.* the respective needs of the several fins.

(6) Occasionally the dorsal radials coalesced (as in *Notidanus* &c.) and sought centripetally (as in *Pristis* &c.) adhesion to the skeletal axis.

(7) The rays of the hinder paired limbs did so more constantly, and ultimately prolonged themselves inwards by mesiad growths from their coalesced bases, till the piscine pelvic structure arose as we see it in *Squatina*¹

(8) The pectoral rays with increasing development also coalesced proximally, and, thence prolonging themselves inwards to seek a *point d'appui*, shot dorsad and ventrad to obtain a firm support and at the same time to avoid the visceral cavity. Thus they came to abut dorsally against the axial skeleton and to meet ventrally together in the middle line below.

(9) The lateral fins, as they were applied to support the body on the ground, became elongated, segmented and narrowed, so that probably the line of the propterygium, or possibly that of the mesopterygium, became the axis of the digit-bearing limb.

(10) The distal end of the incipient cheiropterygium either preserved and enlarged preexisting cartilages or developed fresh ones to serve fresh needs, and so grew into the developed cheiropterygium; but there is not as yet enough evidence to determine what was the precise course of this transformation.

(11) The pelvic limb acquired a solid connexion with the axial skeleton, a pelvic girdle, through its need of a *point d'appui* as a locomotive organ on land.

(12) The pelvic limb became also elongated; and in those cases where its function was quite similar to that of the pectoral limb its structure became also quite similar (*e. g.* *Ichthyosaurus*, *Plesiosaurus*, *Chelydra*, &c.); but for the quadrupedal mode of progression it became segmented and inflected in a way generally parallel with, but (from its mode of use) in most cases in part inversely to, the inflections of the pectoral limbs.

The amount of apparently spontaneous change needed to effect these transformations may appear excessive; but I believe that the excessive plasticity of the animal organism is generally too little appreciated—a plasticity which results in and is evidenced by the many instances we now know of the independent origin of similar structures. The plasticity of animals might be expected to be great; for plasticity is bodily reaction in response to external stimuli. The response which is most rapid and complete is sensation; and an animal is a creature

¹ This view has been put forward by Mr. J. K. Thacher of New Haven, Connecticut. See Connecticut Trans. vol. iii.

the essence of which is "impressibility," and may be described as a more or less complex arrangement for carrying about, nourishing, and propagating a plexus of sensations.

The two initial questions may then, in conclusion, be answered as follows:—

(1) Vertebrate limbs are differentiations of continuous lateral folds. They are therefore not limited to four, and are for locomotive convenience. There might apparently be several successive paired limbs on each side, just as there are often several successive dorsal fins paired; and azygos fins and limbs being of the same nature, each separate part may be called a pterygium, and for the sum total of the whole the term *sympterygium* may be employed.

(2) Piscine limbs are related to digit-bearing limbs as structures which have diverged less from the primitive condition, a natural consequence of fishes making use of their fins in that medium in which the primitive continuous lateral folds were first developed.

This paper will be published entire in the Society's Transactions.

The following papers were read:—

1. Reports on the Collections of Birds made during the Voyage of H.M.S. 'Challenger.'—No. VII. On the Birds of Cape York and the neighbouring Islands (Raine, Wednesday, and Booby Islands). By W. A. FORBES, F.Z.S.

[Received December 18, 1877.]

The collection of Birds made by H.M.S. 'Challenger' at Cape York and in its neighbourhood, of which the following is an account, comprises 61 skins, referable to 37 species. As might have been expected, all, or nearly all, belong to well known Australian forms, one or two only being left uncertain for want of more materials and on account of the immature condition of the specimens. Most of the skins are in excellent condition; and their value is much increased by the notes in Mr. Murray's journal as to the colour of the soft parts &c. Besides Cape York, Raine Island (at the end of the Barrier Reef), Wednesday Island (in Torres Straits), and Booby Island (also in Torres Straits) were visited, and collections made. I copy the following extracts from Mr. Murray's journal as regards the localities where birds were obtained:—

"Raine Island, Barrier Reef, Australia. Ship landed two boats for nearly three hours. The following birds were taken" (several sea-birds, *Rallus pectoralis*, and *Strepsilas interpres*).

"Cape York, Somerset. Ship arrived on evening of 1st Sept., 1874; left Cape York on Sept. 8th." (44 skins were obtained here).

"Wednesday Island, Torres Straits. Parties landed the same day (Sept. 8). Most of the birds seen were the same as those shot

about Cape York. The following two, however, have not been procured at Cape York; they were shot on shore (*Totanus incanous* and *Ægialites inornatus*). A great many flocks of Bee-eaters were noticed making passages between the islands."

"On 9th Sept., 1874, a party landed on Booby Island, a very small island, with only a few shrubs on it. The following land birds were shot or brought on board; and in addition a Rail was seen, a *Megapodius*, and one other land bird." (The species obtained were *Todirhamphus sanctus*, *Merops ornatus*, *Zosterops luteus*, *Pachycephala* sp., *Ptilopus superbus*, and *Synœcus cervinus*.)

In the following list I have, with a few exceptions, followed the arrangement and nomenclature of Mr. Gould's 'Hand-book to the Birds of Australia.'

1. NINOX BOOBOOK (Lath.).

Ninox boobook, Sharpe, Cat. of B. ii. p. 168.

Spiloglaux marmoratus, Gld. Handb. B. Austr. i. p. 73.

One male skin of this species from Cape York. No. 167. "Stomach contained insects" (Murray, MS.).

The specimen sent agrees generally with two skins in Mr. Godman's collection from the same locality, and with Mr. Gould's description of *Spiloglaux marmoratus*, which Mr. Sharpe, in the second volume of his catalogue, treats as "the adult of the large form of *N. boobook*" (l. c. p. 170).

2. PODARGUS PAPUENSIS, Quoy & Gaim.

Podargus papuensis, Quoy & Gaim. Voy. de l'Astrol. Ois. t. 13; Gould, B. of Austr. Supp. pl.; id. Handb. B. Austr. i. p. 91.

"No. 186, ♀. Eyes red, feet and bill light yellow. Stomach contained insects." Cape York, one specimen.

3. MEROPS ORNATUS, Lath.

Merops ornatus, Gld. B. of Austr. ii. pl. 16; id. Handb. i. p. 117.

In all four specimens of this common Australian species. Two females from Booby Island (Nos. 199, 200), and a pair (♂ & ♀) from Cape York (nos. 147 and 178). Of all the eyes are stated to be "red," and the feet and legs black, except the female from Cape York, which is described as having the legs "with violet tint." The three females differ considerably from one another in the length of the produced middle tail-feathers; in the male the produced part is thinner and at least twice as long as in the other sex.

4. TODIRHAMPHUS SANCTUS (Vig. & Hors.).

Todirhamphus sanctus, Gld. Handb. B. Austr. i. p. 128; Sharpe, Alced. pl. 91.

One specimen from Booby Island. "No. 192, ♂. Eyes black; mandibles black, except base of lower one, which is whitish. Stomach had remains of a crab."

5. *HALCYON MACLEAYI*, Jard. & Selby.

Halcyon macleayi, Jard. & Selby, Ill. Orn. vol. iii. pl. 101; Gld. B. of Austr. ii. pl. 24; Sharpe, Alc. pl. 78.

Cyanalcyon macleayi, Gld. Handb. B. Austral. i. p. 133.

One male specimen from Cape York. "No. 161. Eyes, bill, and legs black. Stomach contained insects."

6. *ARTAMUS LEUCOPYGIALIS*, Gld.

Artamus leucopygialis, Gld. B. of Austr. ii. pl. 33; id. Handb. i. p. 154.

One specimen from Cape York. "No. 177, ♂. Bill blue tipped with black, feet black. Stomach contained insects."

7. *GRAUCALUS HYPOLEUCUS*, Gld.

Graucalus hypoleucus, Gld. B. of Austr. ii. pl. 57; id. Handb. i. p. 196.

One skin of this species from Cape York. "No. 151, ♀. Legs, bill, and eyes black. Stomach contained insects."

8. *PACHYCEPHALA*, sp. inc.

"No. 196, ♂. *Pachycephala*. Eyes brown, bill and legs horn-colour. Stomach had insects."

A single skin of a *Pachycephala* from Booby Island, immature, still retaining some of the rufous feathers characteristic of immaturity in its wings. It is certainly one of the species which, when adult, are yellow beneath, the under tail-coverts being bright gamboge-yellow. The species of this group are so hard to determine, unless males and in adult plumage, that it seems better to leave this bird, although not exactly like any *Pachycephala* I have been able to examine in the British Museum or in Mr. Godman's collection, without a name for the present, more particularly as Mr. Sharpe is, I believe, now working at this group for the next volume of his catalogue.

9. *PINAROLESTES RUFIGASTER* (Gld.).

Colluricincla rufigaster, Gld. B. of Austr. i. p. xxxvii; id. Handb. B. Austr. i. p. 226.

Pinarolestes rufigaster, Sharpe, Cat. of B. iii. p. 296.

"No. 170, ♀. Shrike."

One specimen, from Cape York, of this difficult genus. Mr. Gould, to whom I showed the specimen, was inclined to identify it with his *Colluricincla parvissima*¹ (Ann. & Mag. N. H. ser. 4, x. p. 114), and has kindly lent me the type of that species (which Mr. Sharpe, *t. c.* p. 297, treats as the young of *P. rufigaster*) for comparison. I find, however, that the Cape-York bird has a distinctly shorter wing, a stronger and more arched bill, and is less rufous on the underside. Mr. Sharpe, who has recently worked up this group for his catalogue, has examined this specimen, and refers it to *P. rufigaster*.

¹ Count Salvadori suggests that this really = *P. megarhynchus* of New Guinea.

10. *MANUCODIA GOULDI*, Gray.

Manucodia gouldi, Gld. Handb. B. Austr. i. p. 236; Sharpe, Cat. of B. iii. p. 181.

Manucodia keraudreni, Gld. B. Austr. Suppl. pl. 9.

Two female specimens. "No. 152. Bower-bird. Eyes orange, bill and legs black. Stomach contained small seeds. For curious loop in the wind-pipe see body. This bird was shot on the island opposite Somerset by Moseley." The colours of the soft parts and contents of the stomach are the same in the other specimen.

The two skins sent agree well with Mr. Sharpe's description and differ from Mr. Elliot's figure of the New-Guinea species (*M. keraudreni*) in the points noticed in Gray's original description of the species. The curious conformation of the trachea in *M. keraudreni* has long been known, having been originally described by Lesson. Beccari (Ibis, 1876, p. 252) says he thinks it probable that this is a peculiarity of the male sex. Mr. Murray's notes, however, would seem to contradict this view, unless, as is hardly likely, two species otherwise so nearly allied should differ in this peculiarity.

11. *PTILORHIS ALBERTI*, Elliot.

Ptiloris alberti, Ell. P. Z. S. 1871, p. 583; id. Mon. Parad. pl. xxiv.; Sharpe, Cat. of B. iii. p. 156.

Ptiloris magnificus, Gould, B. Austr. Suppl. pl. 51.

Craspedophora magnifica, id. Handb. i. p. 595.

Six skins of this Rifle-bird from Cape York, four of which are adult males in full plumage, and one a female. Another, marked ♀, is either a young male coming into full plumage, or more probably an aged female assuming male plumage, as some of the feathers on the top of the head show traces of a metallic blue colour, as also does the shoulder, whilst more or fewer of the primaries on each side have acquired the black colour characteristic of the male. Of Nos. 164 and 165 it is noted in Mr. Murray's journal:—"Males: eyes, bill, and legs black, soles of the feet yellow. The stomach contained a red fruit, with a large stone about the size of a pea. Some parts of insects in 165." Of No. 184, "Female: eyes black; stomach contained ants and grubs." Besides the specimens sent, several others seem to have been procured. An interesting account of the shooting of these specimens will be found in Lord George Campbell's 'Log Letters from the 'Challenger,' p. 185.

12. *MIMETA VIRIDIS* (Lath.).

Mimeta viridis, Gld. Handb. B. Austr. i. p. 462.

Oriolus viridis, Gld. B. Austr. iv. pl. 13; Sharpe, Cat. of B. iii. p. 212.

A young male from Cape York, agreeing generally with Mr. Sharpe's description (*l. c.*) of the young bird. "No. 169, ♂. Thrush."

13. *MIMETA FLAVOCINCTUS* (King).

Mimeta flavocincta, Gld. Handb. B. Austr. i. p. 466.

Oriolus flavocinctus, Gld. B. of Austr. iv. pl. 14.

Oriolus flavicinctus, Sharpe, Cat. of B. iii. p. 206.

An adult male from Cape York, agreeing with skins in Mr. Godman's collection, collected by Cockerell. "No. 189, ♂. Shrike. Eyes red, bill red, feet bluish."

14. SPHECOTHERES FLAVIVENTRIS, Gld.

Sphecotheres flaviventris, Gld. B. of Austr. Suppl. pl. 37; id. Handb. B. Austr. i. p. 468; Sharpe, Cat. of B. iii. p. 225.

Three specimens from Cape York, of which two are males in full plumage, agreeing with specimens in Mr. Godman's collection. "Nos. 172, 173. Eyes black, feet flesh, bill black." The third specimen is marked female ("No. 174, ♀. Eyes black, bill horn, legs brownish. Stomach contained insects and seeds"), but, as there are traces of yellow on the breast, is more probably a young male assuming the adult plumage. The orbits in this bird (in the skin) are dark brownish black, not yellow, though this is probably accidental. In other points, too, particularly in the plainly striated under tail-coverts, and the colouring of the upper surface of the head, the specimen hardly agrees with Mr. Gould's description of the female *S. flaviventris*. Mr. Gould, to whom I have shown it, would give no decided opinion on it; but Mr. Sharpe has examined it, and pronounces it to be of this species.

15. PTILOTIS CHRYSOTIS, Lewin.

Ptilotis chrysotis, Gld. B. of Austr. iv. pl. 32.

Ptilotis lewinii, Swains.; Gld. Handb. B. Austr. i. p. 503.

Three skins of this common Australian species, which is not recorded from N. Australia in the 'Hand-book'—two from Cape York, one from Cape-York Island. "No. 150, ♀. Eyes brown, legs slate, bill black. Stomach contained insects." "No. 157, ♂. Eyes brown, bill black, legs blue, different from No. 156 (*P. filigera*). Stomach contained insects, same as 156."

16. PTILOTIS FILIGERA, Gld.

Ptilotis filigera, Gld. B. of Austr. Suppl. pl. 42; id. Handb. B. Austr. i. p. 522.

A single example, from Cape-York Island, of this distinct Honey-eater, originally described by Mr. Gould from this district. "No. 156, ♂. Eyes brown, bill black, legs bluish. Stomach contained insects and small brown bodies like seeds."

17. PHILEMON BUCEROIDES, Swainson.

Tropidorhynchus buceroides, Gld. B. of Austr. Suppl. pl. 44; id. Handb. B. Austr. i. p. 547.

One specimen from Cape York, agreeing with specimens in Mr. Godman's collection. "No. 160, ♀. Leatherhead. Eyes dark red, bill and skin about the head black. Stomach contained beetles and other insects."

18. MYZOMELA OBSCURA, Gld.

Myzomela obscura, Gld. B. of Austr. iv. pl. 67; id. Handb. B. Austr. i. p. 559.

A single skin from Cape York. "No. 159, ♂. Eyes brown¹."

19. DICÆUM HIRUNDINACEUM (Shaw).

Dicæum hirundinaceum, Gld. B. of Austr. ii. pl. 34; id. Handb. B. Austr. i. p. 581.

A single specimen in full plumage, from Cape York. "No. 149, ♂. Eyes black, legs and bill black. Stomach contained green fruit."

20. NECTARINIA FRENATA, Müll.

Nectarinia australis, Gld. B. of Austr. Suppl. pl. 45; id. Handb. B. Austr. i. p. 584.

Three specimens from Cape-York Island (two males in full plumage, and a female) of this Sun-bird, which Mr. Sclater has recently shown to be the *Nectarinia frenata* of Müller (see P. Z. S. 1877, p. 104). "No. 153, ♂; 154, ♂; 155, ♀. Eyes brown, legs and bill black. Stomach contained small insects."

21. ZOSTEROPS LUTEUS, Gld.

Zosterops luteus, Gld. B. of Austr. iv. pl. 83; id. Handb. B. Austr. i. p. 590.

One specimen from Booby Island ("No. 197, ♀. Eyes brown, feet and bill with a bluish tinge. Stomach had small seeds"), which agrees with a specimen of this species collected by Macgillivray, kindly lent to me by Mr. Gould for comparison.

22. CACOMANTIS FLABELLIFORMIS (Lath.).

Cacomantis flabelliformis, Gld. Handb. B. Austr. i. p. 618.

Cuculus cineraceus, Gld. B. of Austr. iv. pl. 86.

A female, from Cape York, of this Cuckoo, agreeing with specimens in Mr. Godman's collection, except in having the breast and underparts much duller rufous, and faintly freckled and banded with dusky—indications, probably, of a young bird. "No. 146, ♀. Cuckoo. Eyes brown, legs yellow on hind aspect, brown on front, bill brown. Contained insects in stomach."

23. CENTROPUS PHASIANUS (Lath.).

Centropus phasianus, Gld. B. of Austr. iv. pl. 92; id. Handb. B. Austr. i. 634.

A female from Cape York. "No. 163. Legs bluish, bill horn. Stomach contained insects."

24. MICROGLOSSUM ATERRIMUM (Gmel.)

Microglossum aterrimum, Gld. B. of Austr. Suppl. pl. 61; id. Handb. B. Austr. ii. 27; Finsch, Pap. i. p. 370.

A pair of specimens from Cape York. "No. 185, ♂: eyes

¹ Mr. Gould says "bright red."

black; stomach contained seeds and fruit. No. 188, ♀: stomach contained fruit, same as 185." The male has the beak larger, and feathers of the crest more developed than the female.

25. *TRICHOGLOSSUS SWAINSONII*, Gld.

Trichoglossus swainsonii, Gld. B. of Austr. v. pl. 28.

Trichoglossus multicolor, Gld. Handb. B. Austr. ii. p. 93.

A pair of this well-known species from Cape York. "No. 145, ♂. Legs and eyes grey. Bill orange, with a darker tinge. Green fruit." "No. 166, ♂. Same as 145."

This species of *Trichoglossus* is not recorded from the north part of Australia in Mr. Gould's Hand-book, though, as noticed by Finsch (Papag. ii. p. 822 and 824), it extends northwards as far as Cape York.

26. *PTILOPUS SUPERBUS* (Temm.).

Ptilonopus superbus, Gld. B. of Austr. v. pl. 57.

Lamprotreron superbus, id. Handb. B. Austr. ii. p. 108.

Two males and a female, from Booby Island, of this Fruit-pigeon. "No. 193, ♀; 194, ♂. Eyes yellow, bills greenish, feet red. Stomachs had nothing in them." "No. 198, ♂. Dove; same as 194. Stomach contained nothing."

27. *CARPOPHAGA ASSIMILIS*, Gld.

Carpophaga assimilis, Gld. B. Austr. Suppl. pl. 67.

Megaloprepia assimilis, Gld. Handb. B. Austr. ii. p. 111.

A male from Cape York, agreeing in coloration and size with specimens in Mr. Godman's collection. "No. 180. Feet green, eyes red, bill greenish yellow, red at base and about nostrils."

28. *GEOPELIA HUMERALIS* (Temm.).

Geopelia humeralis, Gld. B. of Austr. v. pl. 72.

Erythrauchaena humeralis, id. Handb. B. Austr. ii. p. 142.

One from Cape York. "No. 171, ♂. Eyes red, feet purple, bill black. Stomach contained fruit."

29. *GEOPELIA TRANQUILLA*, Gld.

Geopelia tranquilla, Gld. B. Austr. v. pl. 73; id. Handb. B. Austr. ii. p. 144.

A single specimen, apparently immature, of this little ground-dove from Cape York. "No. 148, ♀. Eyes white, cere blue, bill slate, legs pale flesh-colour. Stomach contained small seeds."

30. *MEGAPODIUS TUMULUS*, Gld.

Megapodius tumulus, Gld. B. of Austr. v. pl. 79; id. Handb. B. Austr. ii. p. 167.

A single specimen, unsexed, of a Megapode, from Cape York, agreeing with Mr. Gould's description of *M. tumulus*. "No. 168."

31. *TALEGALLA LATHAMI* (Gray).

Talegalla lathamii, Gld. B. of Austr. v. pl. 77.

A male from Cape York, a district from which it is not recorded by Mr. Gould.

"No. 187. Eyes yellow¹, head red. Stomach contained seeds."

32. *TURNIX MELANOTA*, Gld.

Turnix melanotus, Gld. Handb. B. Austr. ii. p. 182.

Hemipodius melanotus, B. of Austr. v. pl. 84.

Two females of this species, originally described by Mr. Gould from Moreton Bay, agreeing perfectly with the description in the 'Hand-book.' "No. 176. Cape York, Albany Island. Eyes white, feet yellow, bill yellow and black. Stomach contained insects." "No. 195. Booby Island. Eyes white, legs yellow, base of bill yellow, tip black. Stomach contained small round seeds."

33. *SYNÆCUS CERVINUS*, Gld.

Synæcus cervinus, Gld. Handb. B. Austr. ii. p. 195.

A Quail, from Cape-York Island, which agrees with specimens of this species in Mr. Gould's collection. "No. 175, ♂. Eyes brown, feet yellow, (bill?) bluish black."

34. *ÆGIALITES INORNATUS* (Gld).

Hiaticula inornata, Gld. B. of Austr. vi. pl. 19.

Ochthodromus inornatus, Gld. Handb. B. Austr. ii. p. 237.

A female, from Wednesday Island, agreeing with specimens in Mr. Godman's collection, but with the markings on the face and the pectoral band somewhat darker. "No. 191. Wednesday Island. Eyes, legs, and bill black."

35. *TOTANUS INCANUS* (Gm.).

Totanus pulverulentus, Müll. Natuurk. Verhand. Land- en Volkenk. p. 152.

Totanus griseopygius, Gld. B. of Austr. vi. pl. 38.

Gambetta pulverulentus, Gld. Handb. B. Austr. ii. p. 268.

One from Wednesday Island. "No. 190, ♀ Sandpiper. Legs yellow, bill blackish, eyes black. Stomach contained remains of Crustacea."

36. *STREPSILAS INTERPRES*, L.

Three specimens from Raine Island. "No. 128, ♂. Eyes brown, feet light red with black claws, bill black. Stomach contained small calcareous particles." "No. 129, ♀. Same as 128." "No. 142, ♀. Same as 128."

37. *RALLUS PECTORALIS*, Gld.

Rallus pectoralis, Gld. B. Austr. vi. pl. 76.

Two males and a young female, from Raine Island, of this well-

¹ "Brown," according to Mr. Gould; his was probably a younger bird.

known species. The young bird, No. 130, resembles the old one generally in coloration, but has all the colours duller, the transverse barring of the lower surface much less conspicuous and altogether wanting on the breast, the white spots of the scapularies absent, those on the wing-coverts smaller, and those on the tertiaries also smaller, and tinged with rufous; the primaries also are less conspicuously banded with rufous.

"Nos. 126, 127, males. Eyes red, upper mandible dark, the lower with a slight red tinge, feet light brown. Stomach contained beetles, egg-shells, and small calcareous particles."

2. On a Collection of Birds from Abeokuta. By FRANCIS NICHOLSON, F.Z.S.

[Received December 20, 1877.]

(Plate X.)

I have lately received from my friend, Mr. Henry Robin, a small collection of birds made by him in the neighbourhood of Abeokuta. Although preserved in spirits, the birds arrived in very good condition, and have made fair specimens. On showing them to my friend Mr. R. Bowdler Sharpe, he strongly advised me to publish a short list of the species, inasmuch as we have never received any natural-history specimens from Abeokuta before. This collection also adds a species or two to the avifauna of Western Africa; and one bird appears to be new. I have deposited a series of the skins in the British Museum; and Mr. Sharpe has confirmed my identifications. I am indebted to him for a comparison of some of the more obscure species.

1. *SCOPS LEUCOTIS* (Temm.); Sharpe, Cat. B. ii. p. 97.

One specimen, which has apparently died in captivity. I am not aware of the occurrence of this species in West Africa below Senegal having been noted.

2. *MELÆNORNIS EDOLIOIDES* (Sw.); Sharpe, Cat. B. iii. p. 315.

One specimen, somewhat extending the range of this species in Western Africa.

3. *LANIUS SMITHII*, Fraser; Sharpe, Cat. Afr. B. p. 50. no. 478.

Two adults, and three young birds in changing plumage; all apparently males, with no red on the flanks.

4. *DRYOSCOPIUS GAMBENSIS* (Licht.); Sharpe, Cat. Afr. B. p. 48. no. 453.

One male specimen.

5. *DRYOSCOPIUS MAJOR*, Hartl.; Sharpe, Cat. Afr. B. p. 47. no. 450.

An adult specimen.



C. Davenport del et lith.

AMADINA SHARPEI.

Mintern Bros imp



6. *BUTALIS GRISOLA* (L.) ; Sharpe, Cat. Afr. B. p. 42. no. 391.
One specimen.

7. *ELMINIA LONGICAUDA* (Sw.) ; Sharpe, Cat. Afr. B. p. 42.
no. 400.

Four specimens.

8. *BIAS MUSICUS* (V.) ; Sharpe, Cat. Afr. B. p. 43. no. 403.
An adult male.

9. *PLATYSTIRA CYANEA* (Müll.) ; Sharpe, Cat. Afr. B. p. 44.
no. 412.

A large series of specimens, containing both sexes and the young birds.

10. *HIRUNDO ÆTHIOPICA* (Blanf.) ; Sharpe, Cat. Afr. B. p. 46,
no. 432.

The first occurrence of this Swallow in Western Africa. I have compared it with several specimens from North-eastern Africa in the British Museum, and I have no hesitation in pronouncing it to be *H. æthiopica*. It is not quite so purple as Bogos-Land skins ; but this is probably due to the fact of its having been preserved in spirits.

11. *TURDUS ICTERORHYNCHUS*, Cab.

T. pelios, Sharpe, Cat. Afr. B. p. 21. no. 187 (nec Bp.).

Four specimens.

12. *CRINIGER SIMPLEX* (Temm.) ; Sharpe, Cat. Afr. B. p. 22.
no. 197.

Four specimens.

13. *PYCNONOTUS BARBATUS* (Desf.) ; Sharpe, Cat. Afr. B. p. 23.
no. 214.

Five specimens.

14. *COSSYPHA VERTICALIS*, Hartl. ; Sharpe, Cat. Afr. B. p. 26.
no. 237.

Three specimens.

15. *HYPOLAIS OPACA* (Licht.) ; Dresser, B. Eur. part xxviii.
One specimen.

16. *CINNYRIS FULIGINOSUS* (Shaw).

Nectarinia fuliginosa, Sharpe, Cat. Afr. B. p. 39. no. 362.

One specimen.

17. *CINNYRIS SPLENDIDUS* (Shaw).

Nectarinia splendida, Sharpe, Cat. Afr. B. p. 38. no. 357.

One specimen.

18. *CINNYRIS VENUSTUS* (Shaw).*Nectarinia venusta*, Sharpe, Cat. Afr. B. p. 40. no. 376.

Three specimens.

19. *PHOLIDAUGES LEUCOGASTER* (Gm.); Sharpe, Cat. Afr. B. p. 54. no. 514.

Two pairs, the males exhibiting the very extreme of the bluish and reddish purple shades prevalent in this species.

20. *HYPHANTORNIS BRACHYPTERA* (Sw.); Sharpe, Cat. Afr. B. p. 59. no. 561.

One example.

21. *HYPHANTORNIS TEXTOR* (Gm.); Sharpe, Cat. Afr. B. p. 59. no. 257.

Two adult males.

22. *NIGRITA CANICAPILLA* (Strickl.); Hartl. Orn. W.-Afr. p. 130.

The single specimen sent is more ashy and not of such a clear cinereous grey as Gaboon examples, and the spots on the wings are smaller; the shade, however, may be owing to the specimen having been preserved in spirits. The conspicuous white spots on the wings and the white rump show that the bird belongs to *N. canicapilla* and not to *N. emiliæ*.

23. *EUPLECTES FRANCISCANA* (Isert); Sharpe, Cat. Afr. B. p. 62. no. 588.

Four adult males in full plumage.

24. *VIDUA PRINCIPALIS* (L.); Sharpe, Cat. Afr. B. p. 63. no. 600.

A female bird.

25. *HYPOCHERA CHALYBEATA* (Müll.); Sharpe, Cat. Afr. B. p. 64. no. 604.26. *PYRENESTES CAPITALBUS* (Temm.); Sharpe, Cat. Afr. B. p. 68. no. 650.

A female bird, doubtless belonging to this species.

27. *SPERMOSPIZA HÆMATINA* (V.); Sharpe, Cat. Afr. B. p. 68. no. 653.

One specimen, not in full plumage.

28. *CRITHAGRA CHRYSOPYGA* (Sw.); Sharpe, Cat. Afr. B. p. 67. no. 638.

One specimen.

29. *AMADINA SHARPII*, n. sp. (Plate X.).

Supra olivascenti-flava, tectricibus alarum dorso concoloribus; remigibus fuscis, extus dorsi colore marginatis, secundariis in-

ternis dorso concoloribus: caudâ olivascenti-flavâ, rectricibus exterioribus intus fuscis; pileo summo colloque postico cinereis; fronte angustâ, loris et facie laterali albis; lined angustâ pone-auriculari nigrâ; guld totâ nigrâ; jugulo et pectore summo cinereis; abdomine, subcaudalibus tibiisque cinerascens; corpore laterali lætè flavo; subalaribus fulvis, flavo lavatis; margine alari flavo; remigibus infrâ brunneis, intus albicanti marginatis; rostro nigro; pedibus brunneis. Long. tot. 4.3, culm. 0.4, alæ 2.35, caudæ 1.95, tarsi 0.65.

The accompanying figure will give a good idea of this beautiful little Finch, which is not allied to any other African species, and appears to be quite new to science.

30. *CYPSELUS PARVUS* (Licht.); Sharpe, Cat. Afr. B. p. 2. no. 13.

One specimen.

31. *MEROPS SUPERCILIOSUS* (L.); Sharpe, Cat. Afr. B. p. 3. no. 21.

One specimen.

32. *ISPIDINA PICTA* (Bodd.); Sharpe, Cat. Afr. B. p. 7. no. 53. Five specimens.

33. *HALCYON SENEGALENSIS* (L.); Sharpe, Cat. Afr. B. p. 8. no. 66.

One specimen.

34. *CHRYSOCCYX KLAASI* (V.); Sharpe, Cat. Afr. B. p. 13. no. 112.

Ten specimens, in all states of plumage.

35. *BARBATULA SUBSULPHUREA* (Fras.); Sharpe, Cat. Afr. B. p. 16. no. 139.

Three specimens.

36. *DENDROPICUS GOERTÆ* (Müll.); Sharpe, Cat. Afr. B. p. 18. no. 165.

One specimen.

37. *PERISTERA TYMPANISTRIA* (Temm.); Hartl. Orn. W.-Afr. p. 197.

One specimen.

38. *ACTITIS HYPOLEUCUS* (L.); Hartl. Orn. W.-Afr. p. 235.

One specimen.

3. On the Manifestation of Anger, Fear, and other Passions, in Fishes, and on the Use of their Spines.¹ By the Rev. S. J. WHITMEE, C.M.Z.S.

[Received January 2, 1878.]

In his remarks on the erection of the dermal appendages by various animals under the excitement of anger and terror Mr. Darwin ('Expression of the Emotions in Men and Animals') confines himself to "three of the great Vertebrate classes," viz. mammals, birds, and reptiles (p. 95). When I first read the passage referred to, I tried to think of some reference to the manifestation of anger by fishes in books with which I am familiar, but I failed to call any to mind. And as Mr. Darwin has not brought forward any examples as to how fishes manifest their "emotions," I am almost compelled to believe no observations have been recorded. I read, too, in the article 'Ichthyology,' in the 'Encyclopædia Britannica' (vol. xii. p. 221, 8th ed.), after a fanciful comparison between birds and fishes, to the great disadvantage of the latter, that "the silent dweller in the deep knows few attachments, expresses no language, cherishes no affections, . . . the cravings of hunger seem alone to exercise a frequent and influential action over his monotonous movements;" and that "by whatever scenes in nature fishes are surrounded, their perceptions are probably indistinct and dull"².

Notwithstanding that so little appears to be written on the manifestation of feeling by fishes, it strikes me many persons who have kept an aquarium must have noticed that they show anger quite as plainly as any other animals.

For some time past I have kept a good sized aquarium for the instruction and amusement of myself and my family. My house is situated on the coast, and has a belt of shallow and smooth water before it, formed by the coral-reef which runs along in front of it nearly a mile out at sea. This lagoon is a fine place for fishes; and I encourage the natives to bring me any thing remarkable they obtain when fishing there. I have therefore often had fishes belonging to several genera together in my aquarium. Amongst other things I have had opportunities of watching their quarrels, which are by no means infrequent among the individuals of the same species, and which are of constant occurrence between different species and genera. The signs of anger in most fishes are so obvious that one of my boys, between three and four years old, who is fond of making his own observations in natural history, knows an angry fish as well as most people know an angry bull or an angry boar.

¹ This paper was written in Samoa, in October 1875, and is given in its original form. S. J. W., December 27, 1877.

² There are other remarks in the article mentioned which, I presume, will be corrected in the new edition of the 'Encyclopædia'—such, *e. g.*, as the statement that the elegant and diversified colours of fishes are probably for the special gratification of man. Unfortunately these quickly disappear when man gets possession of the fish.

When swimming in a placid condition, the anterior portion of the dorsal fin in fishes is seldom elevated; hence the spines which occupy this position are laid back more or less closely, and are often scarcely visible¹. The anal fin is also often not fully expanded; but I have not usually seen this so marked as in the dorsal. On the least fright up goes the dorsal, and the spines are at once elevated. As an example of how slight a cause will suffice to produce this change, I may mention that, before writing the last sentence, I rose from my desk and lightly tapped the front of my aquarium. The anterior dorsal fins of its inhabitants (previously laid back) were instantly elevated, and all assumed the attitude of attention. Under the influence of great anger or fear, such as would be caused by the presence of a carnivorous fish in the aquarium, the dorsal fin is raised to its extreme height, and the spines, both of the dorsal and anal fins, are very prominent. The scales all over the body are also more or less raised, and with them, of course, any other dermal appendages the particular fish may possess. This causes it to assume larger proportions than under ordinary circumstances.

I believe the spines are elevated under the influence of fear as well as by anger. I was once trying to catch a *Tetrodon nigropunctatus* which was in my aquarium, when it inflated itself and elevated the fine spines with which its body was covered, and which were previously buried in its loose and flabby skin. This of course was under the influence of fear. And this appears to give a hint as to the purpose for which this fish and those of the genus *Diodon* inflate themselves.

When I have observed fishes chasing each other, apparently in playfulness rather than anger, I have often seen them swim at each other with open mouths as if to bite. But when they have appeared to intend a serious attack they have always turned suddenly round and lashed at one another with the caudal fin. I believe serious fighting is always done with the tail. And from their anatomy one would naturally expect this to be the chief mode of attack in most fishes.

I incidentally mentioned this way of fighting by fishes in a paper recently sent to the Society, in which I described an attack made by some small fishes on an *Antennarius*². These little things were evidently in great dread of their carnivorous neighbour. But, like small birds in presence of a bird of prey, they could not keep at a distance, but continually tried to torment it. In attacking it they always took care to strike at its posterior part, although this was protected by a block of coral. I said, in the paper referred to, that this mode of attack by the tail ought to be very effective in the case of an *Acanthurus*, and that it may account for the armature of the Acronuridæ.

In connexion with this subject I will mention a thought which has often occurred to me as to the chief purpose served by fishes'

¹ Drawings of fishes usually represent them with *all* the fins fully expanded and the spines prominent; but this is not their ordinary condition.

² See P. Z. S. 1875, p. 545.

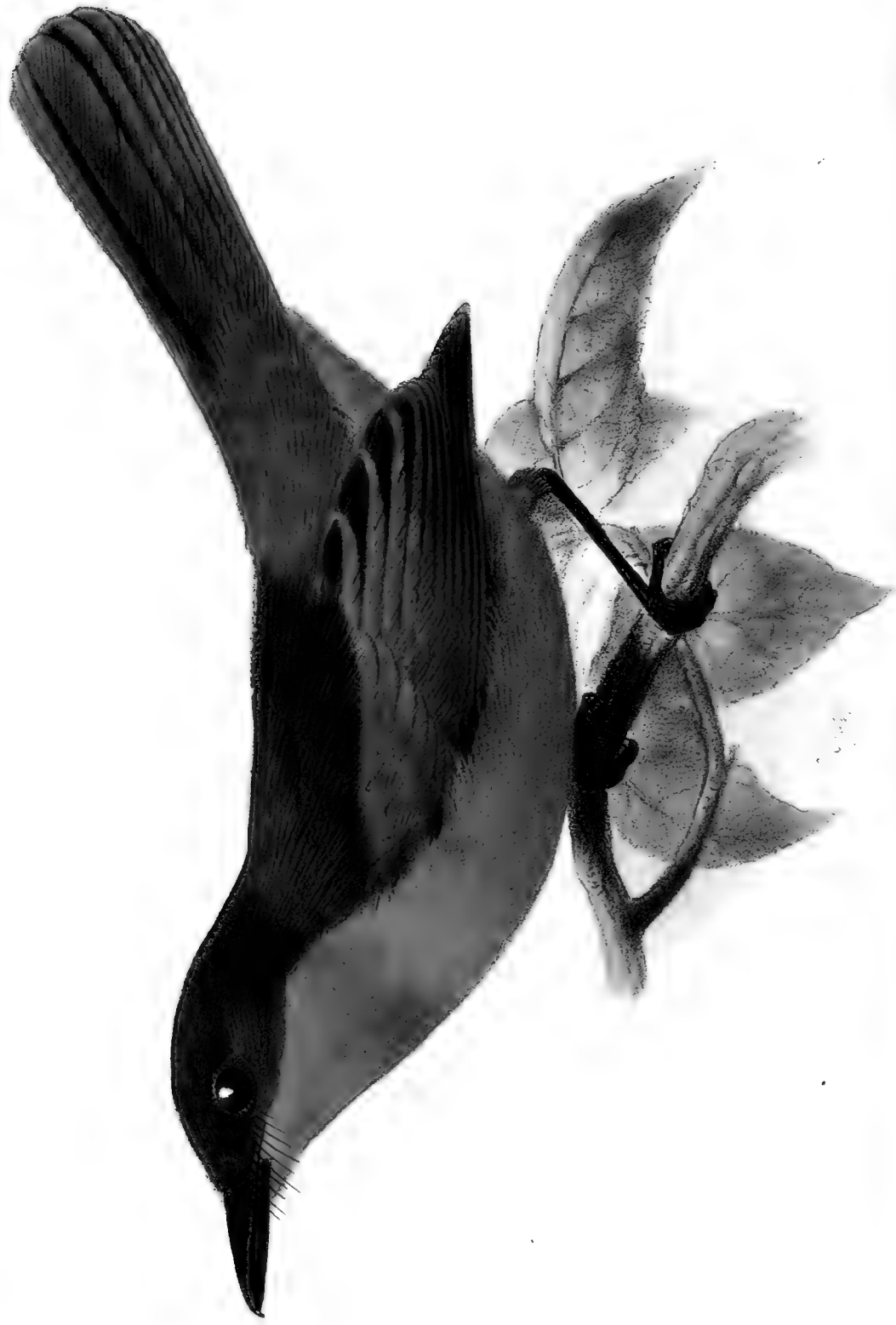
spines, viz. protection against the attacks of those of the class which are carnivorous. I have never seen a fish try to use its dorsal spines actively to strike with. But I have seen a *Balistes* swim rapidly past an antagonist, and graze its side with its file-like lateral spines. I am strongly inclined to believe the dorsal and anal spines are used for defence only.

There is little doubt that most carnivorous fish capture their prey by outswimming them, as most carnivorous quadrupeds capture theirs by outrunning them. In the shallow waters within our reefs it is a very common thing to see shoals of fish leaping out of the water when chased by the larger ones which prey upon them. They pass along with a series of springs at a great rate; and the noise they make is heard at a long distance. Most fishes thus chased would, if captured, be seized from behind. If so, the strong spines on the anal and dorsal fins, inclined as they are backwards, would often be of immense value to their possessors in preventing them from being swallowed. I am inclined to believe this is the chief, if not the sole, use of these spines¹.

If this view be correct, those fish most exposed to the attacks of others which are carnivorous ought (other things being equal) to be best protected. I have not given sufficient attention to the subject to say whether this be so or not. But from a merely superficial examination I fancy further investigation would prove that spiny fishes are more frequently found in confined and shallow waters, where they have little opportunity of escape; and that slow-swimming fishes are most frequently protected with peculiar defensive armature. The *Diodon* and *Tetrodon* may serve as examples of the latter. They swim slowly, and if unprotected would be specially liable to be preyed upon by carnivorous fish. Unless alarmed neither look formidable. In both of them the spines are ordinarily concealed in the soft and loose skin; and then they present a very different appearance from the stuffed specimens or plates by which they are chiefly known. But the individuals of both genera possess the power of very rapidly inflating their loose skins, and thus erecting the spines with which they are more or less completely covered. In the case of the *Diodon* there can be no doubt that its inflated and bristling appearance would serve to protect it from attack; and I imagine the most voracious monster would think twice before attempting to feast on the less-protected *Tetrodon*.

¹ Since the above was written I have seen a proof of the correctness of this view as to the use of spines. I was one day passing along the lagoon on the shores of Upolu, when my boatmen noticed a great splashing in the water at a distance. Knowing the cause, they pulled for the place. There we saw a large fish with a smaller one sticking in its jaws, caught apparently by the erected spines. They got separated just as we approached, and before my crew could secure them; but the natives told me they not unfrequently take fishes in that way. Sometimes they find both dead, one firmly sticking by its spines in the jaws of the other.—December 1877.





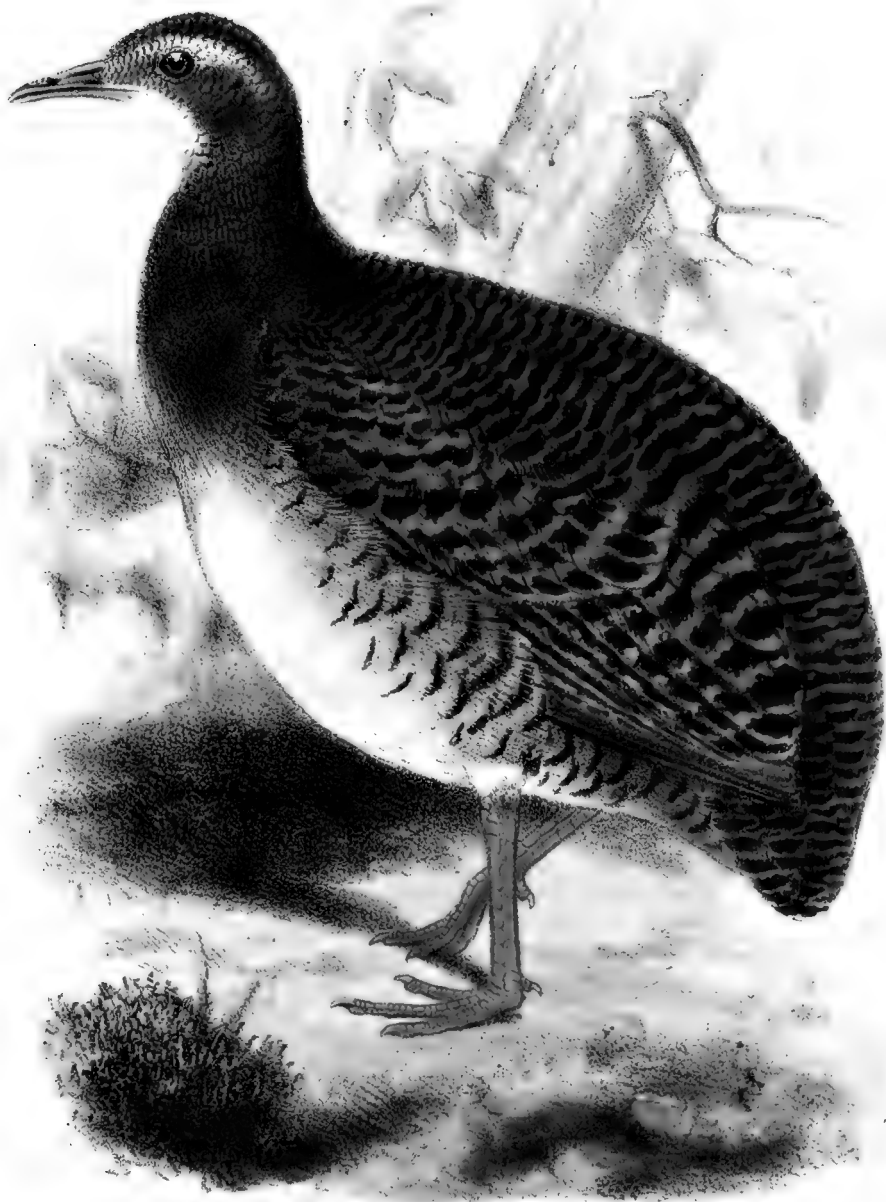




J.Smit lith.

Hanart imp





$\frac{1}{2}$

Small. 1878

Harvard. 1878

CRYPTURUS TRANSFASCIATUS

4. On the Collection of Birds made by Prof. Steere in South America. By P. L. SCLATER, M.A., Ph.D., F.R.S., and OSBERT SALVIN, M.A., F.R.S.

[Received January 3, 1878.]

(Plates XI.-XIII.)

At the request of Prof. J. B. Steere, of the University of Michigan, U. S. A., we have had great pleasure in examining the collection of birds which he made during his recent transit across South America, from Para to Callao, and in determining and naming the specimens.

In Nov. 1870, Prof. Steere went from Para first to Vigia, on the south bank of the Amazons, near the mouth, above fifty miles below Para. Returning to Para he next visited Arare, on the south side of the island of Marajo. On finally leaving Para for the interior, in June 1871, he ascended the river to Santarem, and from Santarem visited Obidos on the north bank. From Santarem he continued upwards to Manaos, or Barra, as it was formerly called, and thence made an excursion up the Purus river to Ituchy and Marrahan. Leaving Manaos in Oct. 1871, he ascended the main stream to Pebas, in Peru, where several skins, having the well-known "make" of Mr. Hauxwell (amongst which is a skin of *Porzana hauxwelli*, nobis), were procured. From Pebas Prof. Steere continued the ascent of the river to Barrancas and Pongo Manseriche, at the foot of the Andes, but returned downwards to the mouth of the Huallaga, and then ascended that stream to Yurimaguas, where he arrived in March 1872.

Here the voyage by steam came to an end, and Prof. Steere proceeded across country, via Tarapota, Moyobamba, Rioja, Chachapoyas, and Caxamarca, to the Pacific coast at Truxillo. From Truxillo Prof. Steere kept along the coast, viâ Pacasmayo to Sorritos¹ and Tumbes, where, as will be seen by our notes, many of the local and interesting species of Western Peru were met with. From Tumbes Prof. Steere went to Guayaquil, and thence up to Quito and back. Next he proceeded to Lima by Callao, and made an excursion from the Peruvian capital up the Rimac and over the Andes, to the vicinity of Cerro de Pasco, returning finally to Callao. From Callao Prof. Steere sailed, in May 1873, for China and the Philippines, where he made those great discoveries in ornithology which have already rendered his name well known to ornithologists².

¹ Sorritos I do not find marked in the maps; but Professor Steere tells us it is on the coast, about 20 miles south of Tumbes.

² See Mr. Sharpe's memoir in Trans. Linn. Soc. n. s. Zool. vol. i. p. 307 *et seqq.* (1877).

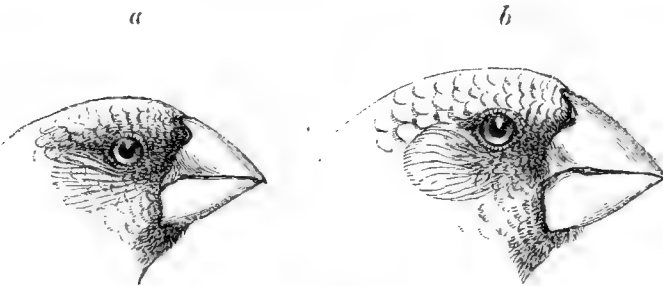
During his journey across South America Prof. Steere made a collection of 911 skins of birds, belonging to about 362 species of the following groups:—

	ex.	sp.		ex.	sp.
1. Passeres	503	145	9. Herodiones ..	13	9
2. Cypseli	108	52	10. Anseres	5	4
3. Pici	23	17	11. Columbæ	27	14
4. Coccyges	93	45	12. Gallinæ	7	5
5. Psittaci	35	16	13. Grues	4	4
6. Striges	14	5	14. Limicolæ	41	18
7. Accipitres	23	16	15. Gaviæ	7	5
8. Steganopedes . .	3	3	16. Crypturi	5	4

As might have been expected from the fact of Prof. Steere not having made a lengthened stay at any of the localities visited, the greater number of the specimens which he collected belong to well-known species, which we have named according to our 'Nomenclator Avium Neotropicalium.' But there are examples of twenty-two species amongst them, either unknown to us or otherwise of interest, concerning which we have the following notes to offer.

1. *ORYZOBORUS ATRIROSTRIS*, sp. nov.

Ater æneo-nitens unicolor; remigibus primariis ad basin albis, speculum parvum tectricibus absconditum efficientibus; rostro crasso, nigro; caudâ paulum rotundata: long. tota 6·0, alæ 2·9, cauda 2·7, tarsi 0·75.



a. Head of *Oryzoborus crassirostris*.
b. Head of *O. atrirostris*.

Hab. Moyobamba, Peru (Steere).

Obs. Ab *O. crassirostri* et affinibus rostro robustiore et nigro diversus.

This *Oryzoborus*, of which Prof. Steere only obtained a single example, now in the Museum of the University of Michigan, is quite new to us¹. It is readily distinguishable from *O. crassiros-*

¹ *Sporophila othello*, Bp. Consp. i. p. 498, ex Am. Centr. (Mus. Berol.) is unknown to us and indeterminable, unless the type is existent.

tris and its representative forms (*O. maximiliani*, *O. occidentalis*, and *O. melas*) by its black bill, which, as will be seen by the outline given, is also more robust than in *O. crassirostris*.

There is a small white speculum, which does not extend onto the outer web of the three outer primaries, and is concealed by the greater coverts when in their natural position. On the under surface of the wing the white extends barely half an inch beyond the black under wing-coverts, and then passes into grey, and at the extremities of the feathers into black.

2. *PIEZORHINA CINEREA*, Lafr.

Guiraca cendre, Prév. et Des Murs, Voy. 'Venus,' Ois. p. 209.

Guiraca cinerea, Lafr. Mag. de Zool. 1843, pl. 20 (subg. *Piezo-rhina*).

Camarhynchus cinereus, Gray and Mitch. Gen. B. ii. p. 369; Bp. Consp. i. p. 542; Salvin, Trans. Zool. Soc. ix. p. 491; Tacz. P. Z. S. 1877, p. 321.

MM. Jelski and Stolzmann first discovered the true habitat of this curious Finch, which, through an error of the Naturalists of the Voyage of the 'Venus,' had been assigned to the Galapagos.

Prof. Steere's series contains a single skin obtained in Dec. 1872, at Sorritos, in Western Peru. It is marked "male: eyes light hazel." It agrees in every respect with an example from Tumbes (*Jelski*) in Sclater's collection.

3. *HÆMOPHILA STOLZMANNI*, Tacz.

Hæmophila stolzmanni, Tacz. P. Z. S. 1877, p. 322, pl. xxxvi. fig. 2.

Of this recently described Finch, from the same district, Prof. Steere likewise obtained a single example at Sorritos, in Dec. 1872. It is marked "male: eyes hazel." The discovery of a typical *Hæmophila* (of which the six previously known species are entirely confined to Central America) in Western Peru is a fact of the highest interest.

4. *GNATHOSPIZA RAIMONDII*, Tacz.

Gnathospiza raimondii, Tacz. P. Z. S. 1877, p. 320, pl. xxxvi. fig. 1.

Of this peculiar Fringilline form Prof. Steere obtained four examples during his sojourn at Sorritos.

5. *ICTERUS GRACE-ANNÆ*, Cassin.

Icterus grace-annæ, Tacz. P. Z. S. 1877, p. 323.

Prof. Steere's series contains two skins of this well-marked *Icterus*, described in 1867 by the late Mr. Cassin, from a single specimen in the museum of the Academy of Philadelphia, of which the exact locality was uncertain. The western sea-board of Ecuador and Peru, however, is its undoubted habitat, as the late Prof. James Orton

obtained specimens at Machala, near Guayaquil, as recorded by Salvin (*Ibis*, 1874, p. 323). Jelski and Stoltzmann also found it at Tumbez, as recorded by Taczanowski, *l. s. c.*; and Prof. Steere collected two examples—one at Pacasmayo on the coast north of Truxillo, and the other at Tumbez.

6. *CYANOCORAX MYSTACALIS*.

Pica mystacalis, Geoffr. Mag. de Zool. 1835, pl. 34.

Cyanocorax mystacalis, Scl. et Salv. Nomencl. p. 39, et P. Z. S. 1876, p. 272; Tacz. P. Z. S. 1877, p. 323.

Cyanocorax ortonii, Lawr. Ann. Lyc. N. Y. xi. p. 166.

Of this fine species Prof. Steere obtained one example at Tumbez, where MM. Jelski and Stoltzmann also procured it. Having now, through Mr. Lawrence's courtesy, had the opportunity of examining the type of his *C. ortonii*, we are able to state that our anticipation as to its identity with *C. mystacalis* was quite correct. Prof. Orton's skin is labelled as having been obtained at "Zicapa, Peru, Oct. 22, 1874." It may be remarked, however, that, whereas in Prof. Steere's specimen the five outer pairs of rectrices are wholly white, in Prof. Orton's the pair next to the middle pair have the basal half blue and indications of like colour in the centres of the adjoining pairs. It is probably on some such specimen as this that *C. bellus* of Schlegel¹ was established.

7. *EUSCARTHUS ZOSTEROPS*?

A skin of a Tyrant, obtained by Prof. Steere at Moyobamba, so nearly agrees with *E. zosterops*, Pelzeln, Orn. Bras. p. 173, that we are unwilling to separate it on the faith of a single specimen. But it is certainly larger in its dimensions², has a rather shorter bill, and the edgings of the wing-coverts and secondaries are paler and more distinct.

8. *ORCHILUS ECAUDATUS* (Lafr. et D'Orb.).

A skin of this species from Rioja, Peru, seems to agree well with Sclater's example from San Esteban (P. Z. S. 1868, p. 631). D'Orbigny's original type was from Yuracares, Bolivia.

9. *MYIARCHUS SEMIRUFUS*, sp. nov. (Plate XI.)

Suprà fuscescenti-cinereus; uropygio et alarum caudæque marginibus castaneis, remigum omnium et rectricum mediarum parte mediâ nigricante; subtus ochraceo-rufus unicolor; rostro et pedibus nigris: long. tota. 7·5, alæ 3·4, caudæ 3·3, tarsi 1·0. Hab. Pacasmayo, Peru (Steere).

¹ Cf. Scl. et Salv. P. Z. S. 1876, p. 272.

	Long. tota,	alæ.	caudæ.
² Ex. ex Borba (<i>Natt.</i>)	4·0	2·0	1·7
„ Moyobamba (<i>Steere</i>)	5·0	2·2	2·1

Although so abnormal in colour, we cannot arrange this bird, of which Prof. Steere unfortunately obtained but a single specimen, as otherwise than a typical *Myiarchus*. The wings are rather short, the third, fourth, and fifth primaries being nearly equal and longest. The wing-end, embracing the first five or six primaries, is black, as are the centre portions of the other remiges; but the latter are bordered above and below with rufous. In the tail the black colour is confined to the inner webs of the three middle pairs of rectrices, the two outer pairs being wholly rufous, and the next pair having only a slight trace of the black patch.

10. *MACHÆROPTERUS PYROCEPHALUS*, Sclater.

Machæropterus pyrocephalus, Sclater, Ibis, 1862, p. 176.

Of this beautiful Manikin two examples were procured by Prof. Steere—one at Rioja, and the other at Moyobamba.

11. *ATTILA TORRIDUS*, Sclater.

Attila torridus, Sclater, P. Z. S. 1860, p. 280.

A single skin from Santa Rosa agrees with Sclater's types of his *A. torridus*, except in being rather brighter below and in being rather shorter in the wing. We do not think it distinguishable.

12. *FURNARIUS PILEATUS*, sp. n.

Suprà castaneus, superciliis albis; pileo obscure brunneo; subtus albus, lateraliter ochraceo perfusus; remigibus nigris rufo bifasciatis; rectricibus castaneis, maculâ in pogonio interiore nigrâ præditis; rostro corneo, mandibulâ inferiore ad basin albicante; pedibus nigris: long. tota 6·8, alæ 3·5, caudæ 2·4, tarsi 1·1.

Hab. Santarem, Amazons (Steere).

Obs. *F. figulo* affinis, sed pileo brunneo ed pedibus majoribus diversus.

A single skin of a *Furnarius* obtained at Santarem, on the south bank of the Amazons, seems to be referable to a representative form of *F. figulus*, of S.E. Brazil, distinguishable by its dark brown cap. In *F. figulus* the head is of exactly the same colour as the back.

13. *THAMNOPHILUS SIMPLEX*, Sclater.

Thamnophilus simplex, Sclater, Ibis, 1873, p. 387.

A single skin obtained at Vigia exactly agrees with Sclater's type of this little-known species, now in his collection. It is marked "male: eyes red."

14. *STEATORNIS CARIPENSIS*.

A skin of this bird in Prof. Steere's collection is labelled as having been obtained at Caxamarca, in the Peruvian Andes. This, so far as we know, is much further south than any previously recorded locality

for this wonderful bird. Since we examined this skin, Mr. C. Buckley has sent an example of *Steatornis* from Sarayacu on the Rio Bobonaza, a confluent of the Pastaza, in Ecuador, thus connecting Prof. Steere's Peruvian locality with those hitherto known for *Steatornis* in Columbia and Venezuela.

15. *PICUMNUS SCLATERI*, Tacz. P. Z. S. 1877, p. 327.

We are inclined to refer a skin of a *Picumnus*, obtained at Tumbes in December 1872, to this recently described species, although in this difficult group an actual comparison of specimens is necessary to establish identity.

Prof. Steere's specimen is marked "male," but agrees with a bird described as a female by M. Taczanowski in having the head spotted with white. If, therefore, the sexes are rightly determined in both cases, it would seem that this species differs from most of its congeners in not having the head spotted with red or yellow in the male sex.

16. *CHLORONERPES SEDULUS*.

Campias sedulus, Cab. et Hein. Mus. Hein. iv. p. 153.

Chloronerpis sedulus, Scl. et Salv. Nomencl. p. 99.

A "male" of this little known species was obtained by Prof. Steere at Obidos, on the Amazons. Sclater's collection contains a single female from Guiana; and the type described by Cabanis and Heine was of the same sex. The male, which is hitherto undescribed, differs from the female in having the feathers of the cap terminated with red instead of yellow.

The species is easily recognizable by the large well-defined pale yellow spots on the wing-coverts. Prof. Steere notes the eyes as "blood-red."

17. *COLAPTES RUPICOLA* (Lafr. et D'Orb.).

Colaptes rupicola, Scl. et Salv. Nomencl. p. 101.

A "female" skin from Cajamarca, which we refer to this species, differs slightly from skins obtained in Southern Peru by Mr. Whitely (see P. Z. S. 1869, p. 154) in having the spots on the chest produced laterally into narrow transverse bands. The rump and lower surface are likewise rather deeper in colour.

The label states that the bird is found "in the Upper Andes, among the rocks; nests in mud walls; eyes sulphur yellow."

18. *CAPITO STEERII*, sp. nov. (Plate XII.)

Suprà lætè viridis, pileo vividè coccineo, nuchâ cæruleâ; subtus pallidè limonaceo-flavus, plagâ gulari et alterâ subpectoralî coccineis; ventre viridi flavoque variegato; rostro plumbe-scente, tomîis et apice flavis; pedibus obscurè plumbeis: long. tota 5·8, alæ 2·8, caudæ 1·8, tarsi 0·8.

Hab. Moyobamba, Peru (Steere).

Obs. Affinis *C. richardsoni*, sed colore corporis superioris pallidiore viridi, nuchâ cyaneâ, et pectore limonaceo-flavo sanè diversus.

Of this beautiful new *Capito*, which we have the pleasure of dedicating to its discoverer, there is, unfortunately, but one specimen in the collection, now in the Museum of the University of Michigan. The species is closely allied in form and disposition of colour to *C. richardsoni*, but may be distinguished by the differences pointed out above.

Among some birds lately sent by Mr. G. N. Lawrence of New York to Selater for determination, we find an imperfect skin, evidently of the same species. It was obtained by Walter S. Church at the "head-waters of the Huallaga," during his journey up that river, and belongs to the collection of the Smithsonian Institution.

19. COLUMBULA CAMPESTRIS (Spix).

Five specimens of this species are in Prof. Steere's collection, all of them obtained at Arare, in the island of Marajo. The species, though long ago described by Spix, has seldom been met with by more recent collectors. Natterer, however, secured several examples, mostly in the Brazilian provinces of Goiaz and Cuyaba.

20. LIMOSA FEDOA (Linn.).

Limosa fedoa, Scl. & Salv. Nomencl. p. 146.

One of two specimens of this Godwit was obtained at Santa Rosa, Ecuador; the other is without precise locality. Though the allied *L. hudsonica* ranges throughout South America, this species, so far as we know, has not hitherto been noticed south of Central America.

21. XEMA SABINII, J. Sab.

Xema sabinii, Coues, Birds of the North-west, p. 660.

Prof. Steere's collection contains a single example of the Fork-tailed Gull, shot at Tumbes, Western Peru. This is the first instance of the occurrence of the species in any thing like so southern a locality, the limit of its southern range having been hitherto supposed to be the Great Salt Lake, Utah. The specimen is in adult winter plumage, the head being white, the nape and back of the neck ashy black, each feather with a very narrow white margin; the mantle is pure grey, and the primaries coloured as in the adult bird.

22. CRYPTURUS TRANSFASCIATUS, sp. n. (Plate XIII.)

Suprà ochraceus, dorso toto et alis extùs nigro transfasciatis; cervice posticâ murino-brunneâ; pileo nigro, ochraceo brunneo transfasciato; superciliis, gulâ et abdomine medio albis; cervice imâ et pectore griseis; hypochondriis et tectricibus caudæ inferioribus cervinis nigro transfasciatis; rostro corneo, mandibulæ basi flavicante, pedibus flavis: long. tota 12, alæ 6·2, caudæ 2·1, tarsi 2·9, rostri a rictu 1·5.

Hab. Santa Rosa, Ecuador (Steere).

Obs. C. variegato et C. bartletti forsan affinis, sed staturâ majore et pectore griseo distinguendus.

This apparently undescribed Tinamou has the back conspicuously transversely barred as in *C. variegatus*, but is much larger than that species and has the whole of the lower part of the neck brownish grey instead of cinnamon. *C. bartletti*, described by us from specimens obtained by Mr. E. Bartlett in Eastern Peru (P. Z. S. 1873, p. 311), is also a smaller bird, and has the whole under surface except the throat fawn-colour; it also wants the light supercilium and the transverse marks on the occiput. In size the new species approaches *C. sallæi*; but the totally different colour of the under surface of this species renders further comparison unnecessary.

Prof. Steere's collection contains two specimens of this species, exactly resembling one another in colour, but differing slightly in size, the bird described above being the larger of the two.

5. Note on the Anatomy of the Binturong (*Arctictis binturong*). By A. H. GARROD, M.A., F.R.S.

[Received January 7, 1878.]

In an earlier communication¹ I was able to confirm the observations of others, and to add fresh details, with reference to the anatomy of *Arctictis binturong*. Since that paper was published, two other specimens of the species have passed through my hands, the earlier of which differed in no respect from the one which I had previously described. The last, however, which died on January 4, 1878, presented a peculiarity which I feel to be deserving of record. It was a female, apparently adult, having lived in the Gardens of the Society since October 19, 1875. The abnormal feature which it presented was the total absence of any trace of the colic cæcum, which, as is shown in a drawing accompanying my former paper, is normally extremely small.

The line of separation between the small and large intestines is well defined; and there is no valvular constriction between the two tubes, as is the case in the Arctoidea generally. There is a large Peyer's Patch quite close to the termination of the smaller gut.

The non-constancy of the presence of the diminutive cæcum in *Arctictis binturong*, and its total absence in *Nandinia binotata*², makes it evident that the existence of the cæcum is a less important diagnostic character than was inferred by earlier investigators.

¹ P. Z. S. 1873, p. 196.

² Vide Prof. Flower's "Note," P. Z. S. 1872, p. 683.

6. Notes on the Anatomy of Passerine Birds. Part IV.

By A. H. GARROD, M.A., F.R.S.

[Received January 7, 1878.]

In my "Notes on the Anatomy of Passerine Birds," Part II., whilst discussing the systematic position of the Eurylæmidæ, I mention that the method of insertion of the tensor patagii brevis muscle of the arm is unknown¹. Through the kindness of Lieut.-Colonel Godwin-Austen, who has placed at my disposal carbolized specimens of *Psarisomus dalhousiæ* and *Serilophus rubropygius*, I have recently had the opportunity of dissecting these species, and am now able to state that in both of them the tendon of the tensor patagii brevis is perfectly passerine, agreeing precisely with the typical arrangement previously described by me in the Order²—the two tendons which traverse the distance between the point where the main tendon joins the extensor metacarpi radialis longus and the elbow running independently and parallel as they course to their humeral attachment.

In neither specimen was I able to dissect out the plantar tendons, because they were so dry and brittle that no amount of soaking would render them fit for observation. I was, however, able to determine some other anatomical points, including the existence of a single carotid artery (the left), a normal disposition of the vessels of the thigh (the main artery of the leg being the sciatic), the considerable size of the femoro-caudal, of the semitendinosus, and of the accessory semitendinosus, and the absence of the accessory femoro-caudal and of the ambiens muscles.

Previous evisceration, I regret to say, prevents my adding any thing with reference to the syrinx and the abdominal viscera; nevertheless I think that now the vomer and the tensor patagii brevis are known to conform exactly with the Passerine type, all shadow of doubt as to the perfectly Passerine structure of the Eurylæmidæ may be dismissed, notwithstanding the aberrant vinculum joining their deep flexor tendons.

So far as its sternum is concerned, *Psarisomus dalhousiæ* so closely resembles *Eurylæmus javanicus*, as figured by Mr. Selater in 'The Ibis'³, that no further remark with reference to it is necessary, except to draw attention to the unforked condition of the manubrium. My specimen of *Serilophus* was too much shot for me to make out its sternal peculiarities.

¹ P. Z. S. 1877, p. 449.

² P. Z. S. 1876, p. 508.

³ Third Series, vol. ii., 1872, p. 179.

7. Descriptions of new Species of Phytophagous Coleoptera.

By MARTIN JACOBY.

[Received January 10, 1878.]

Family EUMOLPIDÆ.

Genus CHALCOPHANA.

1. CHALCOPHANA RUFIPENNIS, sp. nov.

Above, shining bright rufous; below, black; legs testaceous; head with a median depression, impunctate, labrum and antennæ light testaceous; thorax finely and very sparingly punctate, together with the head rufous; elytra of the same colour, distinctly and regularly punctate-striate on the disk, more irregular towards the sides, where also three distinct ribs or costæ are visible running parallel to each other. Underside black, with a metallic green tint; legs and tarsi yellowish or testaceous.

Length 4 lines.

Hab. Costa Rica.

Collected by Mr. Rogers.

This species is closely allied to *C. discolor* of v. Harold, but differs abundantly in the coloration of the antennæ, the underside, and legs.

2. CHALCOPHANA COSTATIPENNIS, sp. nov.

Upper and underside rufous testaceous; antennæ black, the basal three joints ferruginous; femora red; tibiæ and tarsi black; head minutely punctured, with a fovea between the eyes; thorax with a few minute punctures; scutellum smooth; elytra each with about seven distinct costæ, all of which, with the exception of the fifth and sixth, commence below the transverse and deeply marked basal depression; the fourth, fifth, and sixth costæ united at a little distance from the apex; the interstices deeply punctate, the punctures united in pairs.

Length, 3 to 3½ lines.

Hab. Chontales, Nicaragua.

This species, although closely allied to *C. discolor*, Harold, and *C. rufipennis* above described, is distinguished from both by the strongly raised costæ on the entire disk of the elytra and by the entirely black tibiæ.

Genus COLASPOIDES, Castelnau.

3. COLASPOIDES VIRIDICOLLIS, sp. nov.

Oblong-ovate, convex, fulvous above; head, thorax, and a broad margin round the elytra bright metallic green; head sparingly but deeply punctate, with a deep longitudinal groove; antennæ with the first six joints, the labrum, and palpi fulvous, the last four joints of the antennæ much depressed and widened, of a fuscous colour; thorax with the anterior and posterior margin gradually produced in the middle, the sides evenly rounded, with a shallow but distinct

oblique depression at a little distance from the anterior angles, surface distantly but distinctly punctate; scutellum smooth, metallic green. Elytra scarcely wider at the base than the thorax, evenly rounded towards the apex, finely punctate-striate, the interstices plane; the entire lateral margin, with the apex to a greater extent, is of a bright, shining, metallic green, while the rest of the surface is of a light fulvous colour, where the punctures are also surrounded by a piceous spot. Underside (with the exception of the thorax and part of the breast) and legs entirely fulvous.

Length 2 to $2\frac{1}{2}$ lines.

Hab. Amazons.

Collection Jacoby.

Family CHRYSOMELIDÆ.

Genus DORYPHORA.

4. DORYPHORA FLAVOGUTTATA, sp. nov.

Ovate, convex, above dark brown with a slightly greenish tint, each elytron with three fulvous spots; head greenish black, sparingly but distinctly punctured, the punctures on the clypeus more strongly marked; antennæ black, with the underside of the first joint testaceous, as well as the apex of the last joint; thorax with the middle of the anterior margin nearly straight, the lateral margins a little thickened and evenly rounded anteriorly, surface but little shining, of the same colour as the head, deeply punctate, more closely so towards the sides; scutellum triangular, smooth; elytra much wider than the base of the thorax, convex till their middle, but rather suddenly declining towards the apex, surface punctured in the same way as the thorax, and partly arranged in double lines of striæ, each elytron with an oval patch near the scutellum, a transverse one in the middle, and another smaller near the apex, the latter spot sometimes obsolete, of a reddish fulvous colour. Underside and legs greenish, shining; the mesosternal process straight and very acute.

Length 5 lines.

Hab. Volcano of Irazu, Costa Rica.

5. DORYPHORA PUNCTIPENNIS, sp. nov.

Oblong, convex, above brown; base, lateral margins, a transverse vitta, and a subsutural stripe near the apex, of the elytra, flavous; head light brown, with a slight greenish reflection, moderately close and distinctly punctured, labrum lighter-coloured; antennæ larger than the thorax, with the first five joints shining brownish green, the basal joint testaceous below, the rest blackish, hairy; thorax narrowed at the base, from there diverging to the apex, the anterior angles acutely produced, of the same colour as the head, very deeply and coarsely punctate towards the sides, on the disk a little less closely, and leaving a longitudinal middle line smooth; scutellum impunctate; elytra much wider at the base than the thorax, closely variolose-punctate, the punctures arranged in striæ towards the suture, and everywhere distinctly visible to the naked eye, of the

same colour as the head and thorax, shining, the base and the lateral margins (with the exception of a small space a little before the middle, where the margin is interrupted by a brownish black spot, which also extends across the elytral seam below), a transverse vitta from one side to the other, and a short streak running from the apex parallel with the suture flavous. Underside brownish black.

Length $5\frac{1}{2}$ lines.

Hab. Volcano of Irazu, Costa Rica.

Collected by Mr. Rogers.

6. *DORYPHORA FLAVOMARGINATA*, sp. nov.

Oblong-ovate, subdepressed, greenish or brownish; head, lateral margin of thorax broadly, elytral one narrowly testaceous; head and mouth testaceous, the former closely punctate in front of the eyes, nearly smooth in the middle, with a greenish V-shaped mark; antennæ reaching to the base of the thorax, with the first four joints testaceous, the rest more or less stained with greenish black; thorax with the front margin slightly convex in middle, and the sides evenly rounded, surface closely and distinctly punctured at the base only, the rest sparingly and very minutely; a subquadrate greenish black patch narrowed towards its base occupies the middle of the disk, leaving the sides testaceous; scutellum flavous, more or less stained with fuscous, smooth; elytra very little wider at the base than the thorax, semiflattened, of a greenish or brownish tint, irregularly and rather closely punctate-striate, with fine transverse and longitudinal scratches, the lateral margin from the shoulder to the apex testaceous, only punctured near the inner edge, the outer half perfectly smooth with the exception of a single row of rather deep punctures near the extreme margin. Body below, with the exception of the mesosternal process, the tibiæ externally, and the margins of the abdominal segments (the latter of which are testaceous) fuscous, shining.

Length $4\frac{1}{2}$ lines.

Hab. Peru.

Collection Jacoby.

7. *DORYPHORA DORSOMACULATA*, sp. nov.

Ovate, regularly convex, dark fuscous; elytra light green, with a pear-shaped sutural patch, fuscous; head very finely punctate, fuscous, labrum flavous, antennæ with the first joint light, the rest darker brown; lateral margins of the thorax rounded throughout, slightly sinuate in middle, more dispersedly but not coarser-punctured than the head, and of the same colour; scutellum subtriangular, impunctate; elytra strongly punctate-striate (visibly to the naked eye), the striæ arranged in single rows, of which the first is short and the seventh disturbed by a few extra punctures near its middle; the interstices also extremely finely punctate, of a light olive-green colour, with the suture narrowly, the lateral margins more distinctly, part of the extreme base, and, connected with it, a common sutural

pear-shaped patch extending to nearly the middle of the length of the elytra, fuscous brown; a narrow light-flavous stripe accompanies the marginal and sutural one through its entire length. Entire underside and legs fuscous brown.

Length 5 lines.

This species was discovered by Mr. Rippön in Nicaragua.

8. *DORYPHORA INSULARIS*, sp. nov.

Ovate, regularly convex, above greenish black, with a submarginal broad longitudinal vitta light testaceous; head sparingly and finely punctate, labrum fulvous; antennæ rather long, the last five joints flattened and broad, of a greenish black colour; thorax of the same colour, throughout finely punctured with seven or eight deep punctures parallel with the extreme lateral margin; scutellum smooth, triangular; elytra slightly wider at the base than the thorax, punctate-striate towards the suture, the rest of the surface confused-punctate of a more or less dark shining green colour, interrupted only by a broad longitudinal stripe of light testaceous colour commencing a little below the shoulder and extending not quite to the apex. This stripe runs parallel with the extreme lateral margin, but has the inner margin concave a little before the middle, but nearly straight thence to the apex. Underside and legs of a little darker green, shining.

Length $6\frac{1}{2}$ lines.

Hab. Peru.

Collection Jacoby.

Genus *CALLIGRAPHA*, Erichs.

9. *CALLIGRAPHA VIOLACEO-MACULATA*, sp. nov.

Oblong, convex; head and legs ferruginous; thorax and underside greenish, very shining; elytra light flavous, the suture, three transversely placed irregular spots at the posterior half, a median one at the lateral margin, and an oblique, large, bifurcate mark connected with the suture below the base, shining purplish; another short branch of the same colour is sent off from the suture below the middle of each elytron; head very sparingly and minutely punctured, with a triangular-shaped mark at the back greenish æneous; antennæ gradually thickened towards the apex, entirely ferruginous; thorax shining greenish, sides parallel at the base, rounded anteriorly, surface with a shallow fovea near each anterior margin, minutely and sparingly punctate on the disk, with a few deeper punctures near the base; scutellum triangular, the sides a little rounded, greenish black, smooth. Elytra wider at the base than the thorax, of a bright yellow hue, punctate-striate near the suture, the rest of the punctures only plainly visible within the darker markings, the suture broadly, the lateral margins narrowly, purplish; the first is greatly widened in the middle, and connected with an obliquely placed two-branched mark below the base, and another, shorter streak with an upward direction below the middle; besides

this, and two transverse markings at the apex, and placed laterally, is a distinct \neg -shaped spot placed directly below the middle of each elytron. Legs and apex of abdomen ferrugineous.

Length $4\frac{1}{2}$ lines.

Hab. Costa Rica.

Collection Jacoby.

The absence of all smaller spots usually found in the species of this genus, and the peculiar pattern of the elytral markings, as well as the purplish hue of the latter, will distinguish this species from others.

Family GALLERUCIDÆ.

Genus DIABROTICA, Chevrol.

10. DIABROTICA SEXPUNCTATA, sp. nov.

Elongate, subparallel, above dark brick-red, each elytron with three black spots; head flavous, front impressed with a short longitudinal groove, which terminates in a deep fovea, between the eyes, vertex very minutely punctured; antennæ more than half the length of the body, very light testaceous; thorax subquadrate, the lateral margins bulging out slightly before the middle, with all the angles obtuse, surface impunctate, but little convex, of a flavous colour, stained with darker irregular patches; scutellum smooth, triangular: elytra wider at the base than the thorax, and increasing in width towards the apex, distinctly margined at the sides, and closely punctate, the interstices here and there subrugose; they are of a brick-red colour, with a small round spot on the shoulder, another below the base near the sutural margin, and a third behind the middle black. Underside blackish, finely yellowish-pubescent; tibiæ testaceous; claws darker.

Length 5 lines.

Hab. Volcano of Irazu, Costa Rica.

This insect closely resembles in colouring the *D. tripunctata* of Oliv., but differs in the want of the impression on the thorax, besides the different shape of the elytral spots.

11. DIABROTICA VENTRICOSA, sp. nov.

Elongate-ovate, very convex and widened posteriorly, black; head and thorax ferrugineous; elytra with two basal spots, a transverse band in middle and another at the extreme apex flavous; head finely punctate, with two crescent-shaped elevations between the antennæ; the latter very light testaceous, with the apical joints a little darker; thorax subquadrate, very convex, the posterior margin sinuate in middle, and the sides very deflexed near the posterior angles, disk obliquely foveolate on each side, finely punctured everywhere; scutellum transversely impressed near the base, black; elytra very swollen posteriorly, and much widened from before the middle, distinctly punctured, the punctuation partly arranged in striæ, especially so towards the apex, shining black; a large round spot near the scutellum, another small one directly below the humeral callus, a

transverse narrow band in the middle extending from one side to the other, and a still more narrow and shorter vitta at the apex flavous. Body beneath black ; legs and tarsi testaceous.

Length 3 lines.

Hab. Panama.

12. *DIABROTICA FUSCOMARGINATA*, sp. nov.

Elongate, convex, light brown above ; head, disk of thorax, and the elytral margin dark fuscous or black ; head entirely black, impunctate, with a deep fovea between the eyes, the latter very prominent and black, base of the antennæ divided only by a sharp longitudinal ridge ; palpi and antennæ entirely flavous ; thorax scarcely wider than long, quadrate, distinctly emarginate at the sides, the latter slightly widened before the middle, from there straight to the base ; surface very obscurely punctate, shining black or fuscous, with the lateral margins flavous ; scutellum also of this colour ; elytra much wider at the base than the thorax, slightly widened towards the apex, with a narrow but very distinct margin, surface closely and irregularly punctured, of a light brown colour, assuming a flavous hue towards the apex, the base to a greater or lesser extent, and a narrow stripe near the extreme lateral margins not reaching the apex, dark fuscous. Underside, with the exception of the breast (which is black), and legs entirely testaceous.

Length $4\frac{1}{2}$ lines.

Hab. Volcano of Irazu, Costa Rica.

Collected by Mr. Rogers.

13. *DIABROTICA MULTIPUNCTATA*, sp. nov.

Head, thorax, and a narrow sutural and lateral margin of the elytra rufous ; elytra flavous, each elytron with eight small black spots ; head impunctate, with a deep fovea in the middle ; antennæ robust, dark rufous or fuscous ; thorax transversely quadrate, disk bifoveolate, with a black spot in front of each fovea ; scutellum black, impunctate ; elytra subdepressed, widened behind, flavous, the spots placed as follows—one immediately below the base near the scutellum, a second one below the first but near the lateral margin, three placed transversely in the middle, a triangular-shaped spot directly below, and two others, transversely placed, at a little distance from the apex, the sutural and lateral margins rufous. Body below black, closely pubescent ; femora testaceous, with a black line above ; tibiæ and tarsi dark fuscous or black.

Length 3 lines.

Hab. Mexico.

Allied to *D. mexicana*, Harold, but principally differing in the rufous emargination of the elytra.

14. *DIABROTICA NIGROLINEATA*, sp. nov.

Elongate, light flavous ; head and two longitudinal vittæ on each elytron black ; head impunctate, with a deep fovea in the middle ; antennæ longer than half the length of the body, with the third

joint scarcely double the length of the second, the middle joints fuscous, the first and three last joints almost white, extreme apex fuscous; thorax quadrate, obsoletely impressed on the disk, the latter impunctate, shining flavous; scutellum black; elytra irregularly and closely punctate, of a little lighter colour than the thorax, the base, suture, a submarginal longitudinal stripe from the base to the apex, and another stripe on the disk of each elytron, not reaching the apex, black. Body below and femora testaceous; breast, tibiæ, and tarsi black.

Length 3 lines.

Hab. Guatemala.

Collected by Mr. Salvin.

15. *DIABROTICA VIRIDIMACULATA*, sp. nov.

Above black; thorax, a round spot near the base, a transverse vitta behind the middle, the apex, and the extreme lateral margin of each elytron greenish; head black, shining, impunctate, with a deep fovea in the middle; antennæ long, filiform, with four middle joints fuscous, the others light testaceous; thorax quadrate, obsoletely impressed on the disk with two foveæ, and a smaller one near the base; scutellum obscure fuscous; elytra widened behind, narrowly margined, surface closely and finely punctate, with a short longitudinal depression near the sides, black, the margins, a large round spot occupying the apex, another smaller one below the base, and a transverse band behind the middle, not quite touching the suture, light greenish. Underside light flavous; breast, tibiæ, and tarsi fuscous.

Length 3 lines.

Hab. Cayenne.

Collection Jacoby.

16. *DIABROTICA GRACILIS*, sp. nov.

Oblong, green, each elytron with the base and a spot near the apex fulvous; head black, impunctate; antennæ with the second and third joints very short, equal, the first joint light green, the second to the eighth fuscous, ninth and tenth joints light flavous, and the apical one black; thorax quadrate, narrowed near the base, disk bifoveolate, bright green, obsoletely punctured; scutellum black, smooth; elytra closely punctate, a little rugose near the sides, of the same green colour as the thorax, the base in shape of a transverse band, and a large round spot near the apex, bright fulvous, the suture in the neighbourhood of the scutellum, and extending to the end of the basal vitta, narrowly edged with black. Underside green; breast, tibiæ, and tarsi black.

Length $2\frac{1}{2}$ lines.

Hab. Brazil.

17. *DIABROTICA NIGROMACULATA*, sp. nov.

Elongate, green; head and five markings on the elytra black; head shining, with the usual fovea in the middle; antennæ dark

ferruginous; thorax of the same shape as that of *D. gracilis*, obliquely bifoveolate, green, impunctate; scutellum black; elytra a little widened behind the middle, distinctly longitudinally sulcate below the shoulder, surface closely punctured, green, an irregular blotch on the shoulders, a small elongate, triangular sutural mark near the base and below the scutellum, and a transverse narrow spot near the apex of each elytron, not touching the margin or the suture, black. Underside and legs exactly as in *D. gracilis*.

Length $2\frac{1}{2}$ lines.

Hab. Ecuador.

Two specimens, collected by Mr. Buckley, in my collection.

18. *DIABROTICA VARIOLOSA*, sp. nov.

Oblong, convex, widened behind, entirely dark green; head and disk of thorax dark fuscous; head impunctate, with a fovea in middle and a highly raised ridge between the antennæ; the latter with the second and third joints very short, the three basal joints light green, the following three flavous, and the rest ferruginous; thorax quadrate, rather convex, the disk with two foveæ and an indistinct transverse fuscous mark; scutellum triangular, black; elytra convex, much widened towards the apex, and coarsely and irregularly variolose and punctured, of a dark green colour. Underside pitchy black, femora green; the breast on each side covered with a longitudinal patch of golden-yellow hair, and the abdominal segments margined with long greenish hair, which also covers the legs.

Length 3 lines.

Hab. Ecuador.

One specimen in my collection.

This species is allied to *D. marginata* of Sturm, but is devoid of the brownish margin round the elytra, and is distinguished by the colour of the underside and legs as well as of the antennæ.

19. *DIABROTICA PERUANA*, sp. nov.

Elongate, convex, much widened behind, black beneath; thorax flavous; elytra flavous, with the base and a large spot near the apex bluish black; head impunctate, with two distinct tubercles in front of the usual middle fovea; antennæ long, filiform, entirely black; thorax subquadrate, impunctate on the disk, with two foveæ near the sides light flavous; scutellum black; elytra of the same colour as the thorax or a little lighter, with a broad band at the base, not touching the lateral margins, and a large subquadrate spot behind the middle bluish black; the punctuation on the disk very distinct and even coarse towards the base. The entire underside with the legs and tarsi black, finely covered with yellowish hair.

Length $3\frac{1}{2}$ lines.

Hab. Peru.

20. *DIABROTICA SEXPLAGIATA*, sp. nov.

Elongate, parallel; head and thorax testaceous, the latter with a

longitudinal stripe on each side fuscous; elytra dark brown or fuscous, the lateral margins and six roundish spots, 2, 2, 2, whitish; upper part of head finely punctured, in some specimens obscure, of light brown colour, lower part light testaceous; thorax transversely quadrate, the sides rather broadly margined, surface bifoveolate, impunctate, lighter or darker testaceous, with a longitudinal black stripe near the lateral margins; scutellum testaceous; elytra closely rugose-punctate, dark fuscous, with the margins, the apex, and 6 large roundish spots, placed transversely in pairs, whitish. Underside and femora testaceous, with the tibiæ and tarsi fuscous, in one specimen entirely testaceous.

Length 2 to $2\frac{1}{4}$ lines,

Hab. Peru, Panama.

Genus CÆLOMERA, Chevrol.

21. CÆLOMERA ATRO-CÆRULEA, sp. nov.

Broadly ovate, widened posteriorly; head, thorax, and apex of abdomen rufous; elytra bluish black; antennæ and legs black; head more or less deeply and longitudinally depressed, with a narrow mesial groove through its entire length, finely punctate and flavous-pubescent; antennæ with the third joint double the length of the fourth, black, the extreme base of the first joint flavous; thorax broadly rounded at the sides, about twice as broad as long, surface deeply depressed on each side, with a longitudinal groove in the middle of the disk, throughout closely punctate, and covered with short flavous pubescence; scutellum rufous, the apex broadly rounded; elytra much widened towards the middle, distinctly marginate, the sides suddenly deflected from the shoulder, so as to form a distinct longitudinal ridge, which limits the disk of each elytron laterally to the extent of its entire length, surface extremely closely punctate-rugose. Underside dark fuscous, the last abdominal segment rufous; legs and tarsi black.

Length 4 to $4\frac{1}{2}$ lines.

Hab. Peru, Panama.

Notes on previously described Species.

CRIOCERIS AUSTRALIS, Jacoby, P. Z. S. 1876, p. 807.

This species, described by me in 1876, is (as a comparison with the type in the British-Museum collection, of the existence of which I was previously not aware, has convinced me) the true *C. nigripes* of Fabricius. Lacordaire's description of that species (vol. i. p. 573), which I took as a guide, and which made me believe that the insect before me was a different species, is totally at variance with the insect of Fabricius; and my description is therefore the right one, although the name *australis* must stand as a synonym.

RHYPARIDA MADAGASCARIENSIS, P. Z. S. 1877, p. 512.

RHYPARIDA COSTATIPENNIS, P. Z. S. 1877, p. 513.





R. Minton del et lith.

Minton Bro' amp

LOPHOSALEA ANAMALLAYANA

RHYPARIDA NIGRICOLLIS, P. Z. S. 1877, p. 513.

These three species, described by me under the generic name of *Rhyparida*, belong, as subsequent studies have convinced me, to the genus *Syagrus* of Chapuis.

8. Description of a new Genus of Tree-Lizards from the higher Ranges of the Anamallays. By Lieut.-Colonel R. H. BEDDOME, C.M.Z.S.

[Received January 12, 1878.]

(Plate XIV.)

LOPHOSALEA, nov. gen.

Gen. Char. No femoral pores, no lateral wings, tympanum naked; crest of the back and anterior portion of the tail very high, the lobes separate; scales of the back and sides large, irregular, imbricate, subequal in size, but mixed with a few small scales, strongly keeled, the tips directed backwards; a few trihedral or spinous scales above the tympanum; a large gular sac; tail of moderate length, very much compressed; all the scales keeled, the lower ones very prominently.

LOPHOSALEA ANAMALLAYANA, sp. nov. (Plate XIV.)

Three large scales between the base of the orbit and the top of the tympanum; the last of which is much raised and subtrihedral; a spine behind the tympanum, and another between it and the commencement of the nuchal crest; crown of head concave; the rostral shield is subvertical and over the first labial only (not horizontal and over the first and second labials as in *Salea*) a few large trihedral scales form a semicircle across the occipital region in front of the nuchal crest; seven or eight upper labials, the last very small; seven lower labials; tympanum large; eye rather small, eyelid large and scaly as in *Salea*; longitudinal series of quadrangular scales on each side of the gular sac, nuchal crest composed of two small and four large scales, the interspace between this and the dorsal crest very small and occupied by three small crest-scales; the dorsal and subcaudal crest is composed of twenty-eight large thin erect somewhat crimped scales one half an inch in length, and extends along more than one half the length of the tail. Head much narrowed in front, somewhat elongate and pointed as in *Cophotis*; the hind leg, if laid forward, only reaches the shoulder; toes with carinated transverse plates below, the third and fourth toes are very long, the fourth being a little the longer; length of body $4\frac{1}{2}$ inches, of tail $7\frac{1}{2}$ inches; colour of body fawn with irregular transverse bars of white, edged and intermixed with black, three across the body and eight across the tail, a white band along the labials and from the angle of the mouth to the shoulder; belly white.

Hab. Anamallay Mountains, 6000 feet—a very rare lizard.

This genus is allied to *Salea*, from which it differs in its gular sac ; it has more the aspect of the Ceylonese *Cophotis*, from which, however, it is further removed by its naked tympanum.

9. Descriptions of new Uropeltidæ from Southern India,
with Remarks on some previously-described Species.
By Lieut.-Colonel R. H. BEDDOME, C.M.Z.S.

[Received January 12, 1878.]

SILYBURA NIGRA, n. sp.

Snout short, slightly pointed, rostral not nearly separating the nasals ; eye very small, in the front part of the ocular shield, no supraorbital ; scales all in nineteen rows, abdominals 180-185, caudal disk convex, not well defined, scales slightly keeled, subcaudals six to nine pairs, terminal scute of tail bicuspid ; body black, very iridescent, with irregular transverse rows of yellowish-white spots, a yellowish streak commences at the fourth labial and extends along the sides for 1 to 2 inches, sides and belly more or less blotched with broad transverse patches of yellow, the first one or two inches of the belly generally uniform black.

Hab. Pulney Mountains, 4000 ft. elevation.

SILYBURA NITIDA, n. sp.

Snout obtusely pointed ; rostral very small, not nearly separating the nasals ; eye small, in the front part of the ocular shield ; no supraorbital ; fourth upper labial reddish yellow, caudal disk convex, indistinct ; scales three to six ; keeled terminal scute rather large, not laterally compressed, bicuspid, the points side by side, scales in seventeen rows, abdominals 188 to 194. Colour nearly jet-black, but very iridescent ; the belly with very distant large reddish-yellow blotches, the black colour much predominating.

Hab. Anamallays, 4000 to 5000 ft.

SILYBURA PETERSI, n. sp.

Snout obtuse ; rostral very small, not separating the nasals ; tail laterally compressed, caudal disk not defined ; the scales nearly quite smooth or faint traces of keels, the terminal scute shovel-shaped, not bicuspid ; eye very small, in the front part of the ocular shield ; no supraorbital ; abdominals 155 to 158 ; subcaudals ten to twelve pairs ; scales in seventeen rows ; above uniform brown ; sides with indistinct yellowish white spots or narrow transverse bars, which sometimes extend across the belly ; a broad yellowish patch across the vent.

Hab. Anamallays, 4000 ft. Rare ; a small species.

SILYBURA MACULATA, n. sp.

Snout obtuse ; rostral very small, not separating the nasals, which are as large as the frontals ; eye rather large, in the front part of the ocular shield ; no supraorbital ; tail laterally compressed, not well defined ; caudal disk without keels, but a few of the terminal scales a little rugose, terminal scale slightly bicuspid, the points side by

side. Scales round the body in seventeen rows, abdominals about 156, subcaudals eight to thirteen pairs. Colour of a uniform brown or sometimes quite black, with several deep-red blotches along the sides of the anterior portion of the trunk and about the tail, and rarely several of these are present along the sides of the trunk.

Hab. — ?

The tail of this species is more like that of *Plectrurus* than that of *Silybura*; but I prefer to restrict *Plectrurus* to those species which have a supraorbital shield and only fifteen rows of scales.

The snake I formerly described as *Plectrurus trilineatus* has been placed by Dr. Günther in a new genus, "*Platyplectrurus*:" this has the supraorbital and only fifteen rows of scales, but it differs from *Plectrurus* proper in the presence of an elongated temporal shield over the fourth labial, besides in other points, as noted by Dr. Günther; and I think the genus may stand. *Plectrurus sanguineus* (which I find, on a reexamination of the species, has always fifteen rows of scales only round the centre of the body, not seventeen) will belong to this genus; and I have described two other species, *P. hewstoni* and *P. madurensis*.

My *Plectrurus pulneyensis* has been placed by Dr. Günther in *Rhinophis*; but it should, I think, rather be referred to *Silybura*.

My *Silybura canarica* has been referred to *Plectrurus*: it has only fifteen rows of scales (but it wants the supraorbital); the tail, however, is exactly that of the type of *Plectrurus*, with the points of the terminal scutes one above the other. It may form a distinct section in the genus, or have a new genus constituted for it. The only other *Silybura* described with fifteen rows of scales is *Silybura macrolepis* of Peters, which I have never seen, and its locality is unknown; it has evidently the typical caudal disk of *Silybura*. Dr. Günther omits all mention of this species in his synopsis of the species published in the Society's 'Proceedings' in March 1875.

I wish that I could attach the same importance as Dr. Günther does to the number of the abdominal plates; if he is correct in this, I have several new species of the ocellated *Silyburæ* like *S. ocellata*, *liura*, and *melanogaster*.

Specimens of all the species described in this paper have been sent to the British Museum.

10. On the *Larinæ* or Gulls.

By HOWARD SAUNDERS, F.L.S., F.Z.S.

[Received December 31, 1877.]

A revision of the *Larinæ* is a more difficult task than that of the *Sterninæ*, the members of the present subfamily being subject to far greater variations in plumage on their passage from youth to age than is customary with the Terns. The latter, although offering differences in individual size and graduation of tint which are often extremely puzzling, may be said to have only two, or at most three, stages of plumage, viz. the immature, the winter-, and the adult

breeding-state, in the last of which the majority assume a black head or crest; but with the Gulls these conditions are more complex. Even in those species which are destitute of hood at all seasons there is a seemingly endless variation in the pattern of the primaries, the general tendency being to an increase in the lighter and a diminution in the darker portions of the webs with the advancing age of the individual—a rule which also holds good with many of those species the adults of which bear a hood in the breeding-season, whilst, on the other hand, there are others which exhibit the apparent anomaly of having a hood in the immature stage, and losing it in the adult plumage. The individual variations in size are even greater than in the Terns; and the range of the Gulls being, as a rule, less extensive, there are to be found several remarkable isolated and specialized forms, side by side with others, which are little more than climatic varieties of a general type. These circumstances have led to the establishment of a multiplicity of genera and of species, many of them exceedingly ill defined; and it was not until I had examined a considerable series of specimens here, and had visited the Museums of Paris, Leiden, Mainz, Berlin, and Copenhagen, for the purpose of identifying the types with the descriptions, that I could hope to clear up some of the more obscure questions.

The literature of this group has been rendered especially intricate through the perverted ingenuity of two systematists who have undertaken its revision. Boie and Brehm are not guiltless in the matter of genera- and species-making; but their labours were chiefly confined to sorting the European Gulls backwards and forwards into fanciful groups, and to splitting up each species into three or four, which can, for the most part, be easily referred back to their origin. But when Bonaparte and Bruch undertook the revision of the *Larinæ* of the whole world, they speedily enveloped the question in a perfect fog of synonymy, their only object being, apparently, to make as many genera and species as possible. Even distinct genera were erected for one and the same species in different plumages; the most closely allied forms were placed far apart, and widely divergent ones were united; whilst it seemed to be accepted as an axiom that a different geographical habitat was sufficient to constitute a species. Revision followed revision; and to the work of the declining days of both these authors we owe at least half of the synonymy which encumbers these pages. It was their intention to perform a similar office for the Terns; but death cut their plans short, and to this is owing the comparative simplicity of the synonymy of the *Sterninæ*.

The result of their labours appears in Bonaparte's last completed list (for that in the 'Conspectus Avium' was never finished), in the 'Comptes Rendus,' xlii. p. 770 (1856), in which he makes 68 "undoubted" species and 22 genera of *Larinæ* alone, besides 5 more species which he considered doubtful—with justice, as regards four of them, two being his own, one Bruch's, and one Wagler's, whilst the fifth, *Larus fuliginosus*, is an excellent species with which he was evidently unacquainted. To this succeeded the

reaction of common sense in the shape of one of Professor Schlegel's admirable Catalogues raisonnés of the Mus. d'Hist. Nat. des Pays-Bas, a monographical review which, in the words of Prof. Blasius, "is destined to be the foundation of all true Gull-knowledge for those whose ideas of what really constitutes a species are not sacrificed to an arbitrary whim or a geographical sport." The remarks which I have thus translated are to be found in a critical review of great merit in the J. f. Orn. (1865, p. 369, and 1866, p. 73). In this Blasius reduces Bonaparte's species to 35—a diminution which to some degree falls into the other extreme, partly owing to the fact that the author was then unacquainted with several perfectly good species, of which series have since become available, and also to his having united some closely allied forms which, in my opinion, are more conveniently treated by giving them specific rank.

As regards the North-American *Larinæ*, Dr. Elliott Coues has contributed two important reviews (Proc. Ac. Nat. Sc. Philad. 1862, p. 291, and 'Birds of the North-west' (1874); and these, coupled with the excellent Revised List of the Neotropical *Laridæ* by Messrs. Sclater and Salvin (P. Z. S. 1871, p. 564), make us better acquainted with the American species than with those of any other great division of the globe. But although there are probably no undiscovered forms, there still remain many details to be learned respecting the haunts, nidification, and various plumages of the American *Larinæ*, especially those of the Pacific-coast islands; and, indeed, there are two from the Galapagos Islands so rare that the one, *L. fuliginosus*, is only to be found in three or four collections, whilst of the other, *Xema furcatum*, only two examples are known to exist, the one in the Paris, the other in the British Museum.

With regard to several of the Old-World species there are also some important gaps to be filled up; but with one solitary exception, viz. *Rhodostethia rosea*, the least-known species and the most interesting forms are those which are found on the shores and islands of the Pacific, on both the Asiatic and American sides. These will be noticed under their respective heads; and I will now pass on to consider the genera and subgenera amongst which the species have been divided. Most of these have been based upon colour, geographical distribution, or upon the mere caprice of the systematist—upon any thing in short *except* those structural differences which afford a valid reason for their employment; but as many of these genera are either used erroneously or in a perverted sense by those who have not studied the question, I will give a full synopsis of them with remarks. Those genera which appear worthy of retention are printed in small capitals.

GENERA.

LARUS, Linn. Syst. Nat. i. p. 224 (1766).

For all Gulls.

XEMA, Leach; J. Ross, App. ii., Ross's Voy. p. 57 (1819).

The generic characters are given as defined by Leach; these

are afterwards stated more fully by Stephens in Shaw's Gen. Zool. xiii. p. 176 (1825). Type and sole representative then known, *X. sabinii*. Principal characteristic, the *forked tail*.

Xema, Boie, Isis, 1822, p. 563.

For the European *hooded* Gulls; but

Xema, Boie, Isis, 1844, p. 192,

Includes all those Gulls, either with or without hoods, which he has not otherwise located under *Gavia* or *Larus*.

(N. B. *Gavia*, Moehring, 1752, Gen. Av. is prior to the 12th ed. Linn., and need not be considered; and *Gavia*, Brisson, is undefined.)

Gavia, Boie, Isis, 1822, p. 563.

No description, but is applied to two such structurally different species as *L. eburneus* and *L. tridactylus*.

Gavia, Boie, Isis, 1826, p. 980,

Is limited to *L. eburneus* only.

Gavia, Boie, Isis, 1844, p. 191,

Contains the two former and *L. audouini*.

Gavia, Kaup, Nat. Syst. Eur. Thierw. pp. 99, 196 (1829).

For *L. ridibundus* and "*L. capistratus*."

Gavia, Macgill. Man. Brit. Ornith. p. 239 (1842).

For *all* the *hooded* Gulls, including *Xema sabinii*.

Gavia, Bruch, J. f. Orn. 1853, p. 106.

For the small grey-mantled Gulls *without* hoods.

RISSA, Leach, Stephens in Shaw's Gen. Zool. xiii. pt. i. p. 180 (1825).

Type, *R. brunnichii*=*L. tridactylus*. Character—hind toe absent or rudimentary.

Cheimonea, Kaup, Nat. Syst. Eur. Thierw. pp. 84, 196 (1829).

Type, *R. tridactyla*.

PAGOPHILA, Kaup, *op. cit.* pp. 69, 186 (1829).

Type, *Larus eburneus*.

Leucus, misprint *Lencus*, Kaup, *op. cit.* pp. 86, 196 (1829).

For *L. marinus*, *glaucus*, and *fuscus*; but

"*Leucus*, ex Kaup," Bp. Consp. Av. ii. p. 215 (1857),

Omits the black-mantled species and includes the larger grey-backed Gulls.

Hydrocolæus, Kaup, *op. cit.* pp. 113, 196 (1829).

For *L. minutus* and "*L. plumbiceps*," "Gulls with black heads and white eye-streak."

Ichthyaëtus, Kaup, *op. cit.* pp. 102, 196 (1829).

Type and sole representative, *L. ichthyaëtus*.

Laroides, Brehm, Vög. Deutschl. p. 738 (1831).

Includes most of the European hoodless Gulls.

Chroicocephalus, Eyton, Brit. Birds, p. 53 (1836).

Based upon the coloured hood, small size, and more naked tibia. The latter characteristic only holds good with regard to a limited number of hooded Gulls, and is by no means confined to them; whilst none of the other peculiarities adduced seem to be sufficient for generic distinction.

The spelling of this word has been altered to

Kroicocephalus, Jameson, Journ. Asiatic. Soc. viii. p. 243 (1839),

Chroiocephalus, Reichenbach, Nat. Syst. Vög. p. v.,

Chræcocephalus, Strickl. Ann. Nat. Hist. p. 40 (1841),

and to

Chroocephalus, Scl. & Salv. P. Z. S. 1871, p. 576 (note)¹.

Rossia, Bonap. Comp. List B. Eur. & N. Am. p. 62 (1838).

For *L. roseus*. No description of generic character; and the name had already been employed otherwise by Owen.

RHODOSTETHIA, Macgill. Man. Brit. Orn. pt. ii. p. 252 (1842).

Type, *L. roseus*. Generic character described.

Cetosparactes, Macgill. Man. Brit. Orn. pt. ii. p. 251 (1842).

Type, *Pagophila eburnea*. Generic character described. Name altered to

Catosparactes, Gray, Gen. Birds, iii. p. 655, note (1845).

"*Plautus*, Klein," Reichenbach, Nat. Syst. Vög. Longip. p. 5 (1852).

(*N. B.* Klein's Hist. Av. Prodomus, pp. 146-148 (1750), is out of date; and his *Plautus* includes Auks, Gulls, and Petrels.)

Glaucus, Bruch, J. f. Orn. 1853, p. 101.

For the large and medium-sized *grey-mantled* species.

"*Gabianus*, Bp.," Bruch, J. f. Orn. 1853, p. 100 (description); Bonap. Naumannia, 1854, pp. 211, 215; Consp. Av. ii. p. 212 (1857)

Type, *L. pacificus*.

¹ Whilst these sheets are passing through the press, Mr. H. T. Wharton ('Zoologist,' March 1878, p. 105) has pointed out the existence of an adjective, *χρωικός*, meaning coloured; so that Eyton's error (if any) appears to have been merely the omission of the marks of diæresis over the second vowel.—H. S.

Gavina, Bp. Naum. 1854, p. 212.

For *L. canus* and allies, and *L. audouini*; but in

Gavina, Bp. Consp. Av. ii. p. 222 (1857),
the type and sole representative is *L. audouini*.

Dominicanus, Bruch, J. f. Orn. 1853, p. 100; id. *op. cit.* 1855, p. 280.

For the large dark-mantled Gulls, including the author's idea of what *L. cachinnans* of Pallas should be.

"*Leucophæus*, Bp.," Bruch, J. f. Orn. 1853, p. 108 (description).

Type and sole representative, *L. scoresbii*; but

Leucophæus, Bonap. Naumannia, 1854, p. 211,
also includes *L. heermanni*; and in

Leucophæus, Bp. Consp. Av. ii. p. 231 (1857),
are substituted for the latter *L. fuliginosus* and *L. belcheri*.

"*Blasipus*, Bp.," Bruch, J. f. Orn. 1853, p. 108 (description).

Type and sole representative, *L. modestus*, Tsch.; but

Blasipus, Bonap. Naumannia, 1854, p. 211,
also includes *L. crassirostris*, Vieill., and, in the Consp. Av., further
includes *L. heermanni*.

"*Adelarus*, Bp.," Bruch, J. f. Orn. 1853, p. 106, "*Edelmöwen*."

For those species which have both a dark mantle and a hood.

Gelastes, Bonap. Naumannia, 1854, p. 212 (descr. nulla).

For *L. gelastes* and the small *unhooded* southern Gulls.

Atricilla, Bonap. Naumannia, 1854, p. 212.

For *L. atricilla* and the three other pretended species evolved
from it.

Creagrus, Bonap. Naumannia, 1854, p. 213 (descript. nulla);
Bruch, J. f. Orn. 1855, p. 292 (descr.).

Type, *L. furcatus*.

<i>Gavia</i> , Br.	{	Subgen. <i>Melagavia</i> <i>Gavia</i> <i>Cirrhocephala</i>	}	Bonap. Naumannia, 1854, pp. 212, 213.
--------------------	---	--	---	--

For certain hooded Gulls.

Cirrhocephalus, Bruch,

For a species which had a grey hood!

Bruchigavia, Bp. Consp. Av. ii. p. 228.

A genus playfully made, because Bruch's *Gaviæ* were not the

same as the author's *Gavia*! Its only claim to remembrance is its adoption by Mr. W. L. Buller as a genus for a New-Zealand species.

Procellarus et *Epitelarus*, Bonap. Naumannia, 1854, pp. 211, 213.

Genus defined. Type and sole representative, *P. neglectus*, which is an immature *L. scoresbii*. This species the author had already located in the genus *Leucophæus*.

Clupeilarus, Bonap. Consp. Av. ii. p. 220 (1857).

For *L. fuscus*, *cachinnans*, and *verreauxii*. This genus has not even the merit of consistency; for it contains such different species as above, whilst it omits *L. dominicanus* (of which *L. verreauxi* is only the African form) and *L. marinus*.

Of the rejected genera one of the best is *Gabianus*, Bp., of which the sole representative, *L. pacificus*, has a remarkably deep, strong bill. But it differs in no other structural point from other typical species of *Larus*, whilst even in the form of the bill it is at times closely approached by old males of *L. dominicanus*; so that I think its adoption would be inexpedient. *Leucophæus*, Bp., has been confused between the author and Bruch until it includes species which Bonaparte himself has almost simultaneously located in two other genera; and I can see no structural difference sufficiently marked to make it desirable to employ either it or *Blasipus*, which, according to Bonaparte's latest view, includes two species differing considerably in the form of the bill. *Adelarus*, Bp., appears to be the result of an attempt to Latinize the compound word "Edelmöwen," and should rank with his *Bruchigavia* and kindred genera.

The arrangement of the species of *Larus* is matter of considerable difficulty. The plan adopted by Schlegel of dividing the Gulls into *Lari marini*, for unhooded species, and *Lari cucullati*, for those which at one time or another bear a hood, will not stand the test of later experience,—almost all of those which have a hood in their immature stage being emphatically *Sea-gulls*, as are also a few of those which have a hood in the breeding-season; whilst at least two of the unhooded species are partial to inland waters, and present, in consequence, the slight modifications of form shown by many of the hooded marsh-breeding Gulls. Under these circumstances any ascending or descending arrangement must necessarily be artificial; but I have endeavoured to group the species in the most natural manner which seemed to me to be practicable.

It may be as well to observe that by an "adult" bird I mean one which has lost the mottlings, barred tail, and other signs of immaturity; but an "old" bird is often subject to important alterations in the coloration or "pattern" of the webs of the primaries, although the general plumage may undergo no material change. The distinction between the age (in years) of the individual and the age (in months) of the primary and other feathers should also be held in

mind, to prevent confusion, although I have endeavoured to avoid any ambiguity on this point.

Genus PAGOPHILA.

The short stout bill, coarse rough feet with serrated membranes, much excised webs, and strong curved claws appear to entitle this species to generic separation. The hallux is connected on the inside of the foot by a serrated membrane with the inner toe, a peculiarity which I do not recollect seeing noticed elsewhere. The name has been in use for nearly half a century, and is of general acceptance.

1. PAGOPHILA EBURNEA (Phipps).

Larus eburneus, Phipps, Voy. N. Pole, App. p. 187 (1774); Gm. Syst. Nat. i. p. 596 (1788); Scoresby, Arct. Voy. i. p. 535 (1820) (Spitzbergen); Schl. Mus. P.-Bas, *Lari*, p. 6 (1863).

Larus candidus, Müller, Prodrömus, p. viii. (1776); O. Fabr. Faun. Græn. p. 103 (1780).

Larus niveus, Bodd. T. des Pl. Enl. p. 58, no. 994 (1783) (nec Pallas).

Larus albus, Schæff. Mus. Orn. p. 65, tab. 42 (1789).

Gavia eburneus, Boie, Isis, 1822, p. 563; Brehm, Vög. Deutsch. p. 765 (1831).

Pagophila eburnea, Kaup, Nat. Syst. eur. Th. pp. 69, 196 (1829); Gray, Gen. Birds, iii. p. 655 (1849); Newton, Ibis, 1865, p. 507 (Spitzbergen, breeding); P. Wright, Ibis, 1866, p. 217 (Polynia Island, breeding); Dresser, B. of Eur. pts. lix. lx. May 1877.

Gavia nivea, Brehm, Vög. Deutsch. p. 766 (1831).

Cetosparactes eburneus, Macgill. Man. Brit. Orn. pt. ii. p. 252 (1842); Brit. Birds, vol. v.

Larus brachytarsus, Holb. Fn. Græn. p. 52 (1846).

Pagophila eburneus, Bruch, J. f. Orn. 1853, p. 106.

Pagophila brachytarsa, Bruch, J. f. Orn. 1853, p. 106; Lawr. B. N. Am. p. 856 (1858); vide Reinh. Ibis, 1861, p. 18.

Pagophila nivea, Bp. Compt. Rend. xlii. p. 77† (1856); Consp. Av. ii. p. 230 (1857).

Larus (Pagophila) eburnea, Coues, B. N.W. Am. p. 648 (1874).

Hab. Arctic regions, from Novaya Zemlya to Baffin's Bay, and the eastern portion of Arctic America, but not as yet found in the North Pacific. Straggles down the western coast of Europe and Eastern America in winter. I can see no reason for considering Holböll's *L. brachytarsus* to be a distinct species.

Genus RISSA.

The principal characteristic assigned to this genus by Leach is the rudimentary character, or absence, of the hind toe. As this is not always constant, and as certain rare individuals from the North Pacific out of many hundreds, are occasionally to be found with a visible hind claw, and even with a nail, it has been urged by some systematists that it is not a valid genus. The

strongest evidence against it is that brought by Dr. Coues in his 'Birds of the North-West,' p. 646, where he says that whereas "a part of the Kittiwakes from the North Pacific are not distinguishable *in any way* from the North-Atlantic bird, others have the hind toe as perfectly formed and proportionately as large as in any species of *Larus*! And there is a gradation between them." He goes on to cite an extreme example from Plover Bay, with a hallux, including the nail $\cdot 2$ in., with a perfect claw. Whilst writing this paper I have received, through the kindness of the authorities of the Smithsonian Institution at Washington, a similar extreme form with a hallux and nail $\cdot 2$ in., the claw being well formed and curved, although the whole is certainly but small for the size of the bird, as may be seen by a comparison with a species of about the same size, *L. canus*, in which the hallux and nail measure $\cdot 5$ in. Mr. O. Salvin has also lent me two specimens, both, as well as my own, from Alaska, in the one of which the nail is somewhat less developed, whilst in the other it is absent, as in the Atlantic bird. It is probable that this extreme form is both rare and local; at least I have never been able to find any but these two examples amongst the many Kittiwakes, Pacific and others, which I have examined. However, there it is; and if the genus *Rissa* depended solely upon the absence of the hind toe, it would have to be given up. There are, however, other structural characteristics, which, when united, seem to me to have weight. The *tarsus* is *remarkably short*, being only $1\cdot 2$ against $1\cdot 9$ in. in length of middle toe and claw, proportions unknown in any other group of Gulls; the shape of the curved bill is also peculiar; the *tail* is visibly although not deeply, *forked*; whilst these structural differences are supplemented by such minor characteristics as the peculiar livery of the immature bird, totally unlike that of the adult, or of the young of any other species, and by its exclusively crag-nesting habits. Bearing all these points in mind, I think that, although it is no longer absolutely correct to say that the genus *Rissa* depends upon the absence of the hallux, yet it is advisable to retain it as, on the whole, a valid natural division, sanctioned, moreover, by general use during upwards of half a century.

2. *RISSA TRIDACTYLA* (Linn.).

Larus rissa, Linn. Syst. Nat. i. p. 224 (1766); Phipps, Voy. N. Pole, App. p. 187 (1774); Leach, Syst. Cat. Brit. Mus. p. 40 (1816); Scoresby, Arct. Voy. i. p. 534 (1820).

Larus tridactylus, Linn. Syst. Nat. i. p. 224 (1766); O. Fabr. F. Grœnl. p. 98 (1780); Gm. Syst. Nat. i. p. 595 (1788); Schl. M. P.-Bas, *Lari*, p. 31 (1863); Godman, Ibis, 1872, p. 222 (Canaries).

Larus albus, P. L. S. Müller, Natursystem, p. 108 (1776) (based on Buffon's *Mouette cendrée tachetée*).

"*Larus cinerarius*, Linn." O. Fabr. F. Grœnl. p. 101 (1780), nec Linn. (winter-plumage, from description).

Larus riga (mispr.), Gm. Syst. Nat. i. p. 594 (1788).

Larus nævius, Schæff. Mus. Orn. p. 64 (1789).

Larus torquatus et *Larus gavia*, Pallas, Zoogr. Rosso-As. ii. pp. 328, 329 (1811).

Gavia tridactylus, Boie, Isis, 1822, p. 563.

Rissa brunnichii, Stephens, ex Leach, in Shaw's Gen. Zool. xiii. pt. i. p. 181, pl. 21 (1825), type of genus *Rissa*.

Cheimonea tridactylus, Kaup, Nat. Syst. eur. Th. pp. 84, 196 (1829), type of genus *Cheimonea*.

Laroides tridactylus, Brehm, Vög. Deutschl. p. 754 (1831).

Laroides rissa, id., op. cit. p. 755 (1831).

Laroides minor, id., op. cit. p. 756 (1831).

Rissa cinerea, Eyton, Cat. Brit. B. p. 52 (1836).

Rissa tridactyla, Macgill. Man. Brit. B. ii. p. 249 (1842); Hist. Brit. B. v. p. 515; Gray, Gen. Birds, iii. p. 655 (1849); Bruch, J. f. Orn. p. 103 (1853); Bp. Consp. Av. ii. p. 225 (1857).

"*Rissa brachyrhynchus* (Gould)," Bruch, J. f. Orn. 1853, p. 103, nec Gould.

Rissa borealis et *gregaria*, Brehm, Naum. 1855, p. 294.

"*Rissa niveus* (Pall.)," Bruch, J. f. Orn. 1855, p. 285, nec Pallas.

Rissa kotzebui, Bp. Consp. Av. ii. p. 226 (1857).

Larus (*Rissa*) *tridactylus*, Coues, B. N.W. Am. p. 644 (1874).

Larus tridactylus, var. *kotzebui* (Bp.), ibid. p. 646 (1874).

Hab. Arctic region, and along the sea-coasts of the subarctic region, down to about 40° N. lat., breeding perhaps even in the Canaries (*Godman*); in winter it is abundant about the Azores, Canaries, and opposite coast of Africa. In America it is found on both Atlantic and Pacific coasts, but does not seem to extend far down the latter, nor to Japan or China even in winter.

In treating of the genus, I have already noticed that examples are occasionally found about Alaska and the Aleutian Islands with a minute but tolerably developed hind toe, and, at times, with a visible nail, a variation which is rare and *not always equal in extent, even on both feet of the same individual*. I have therefore treated var. *kotzebui* as a synonym, there being no other difference between this and the ordinary Kittiwake, and a gradation between them existing.

3. RISSA BREVIROSTRIS, Brandt.

Larus brachyrhynchus, Gould, P. Z. S. 1843, p. 106; Zool. Voy. of "Sulphur," p. 50, pl. 34 (1844), nec Richardson (1831).

"*Rissa nivea* (Pall.)," Gray, Gen. Birds, iii. p. 655 (1849), nec Pallas; Lawr. B. N. Am. p. 855; Elliot, B. N. Am. pl. 54.

"*Rissa brevirostris*, Brandt," Bruch, J. f. Orn. 1853, p. 103; id. 1855, p. 285; Dall and Bann. Tr. Chic. Ac. i. 1869, p. 305.

"*Gavina citrirostris*, Schimper," Bruch, J. f. Orn. 1855, p. 284 (Kamtschatka).

Rissa brachyrhyncha, Bp. Consp. Av. ii. p. 226 (1857); Coues, P. Ac. N. Sc. Philad. 1862, p. 306.

Larus warnecki, Coinde, Rev. et M. Zool. 1860, p. 401 (Aleutian Islands).

Larus brevirostris, Coues, Key Am. B. p. 315 (1872); Elliot's Prybilov Is. Birds, no. 553.

Larus (Rissa) brevirostris, Brandt; Coues, B. N.W. Am. p. 646 (1874).

Hab. The North Pacific, between Alaska and Kamtschatka, where it is very abundant, breeding in thousands on the Prybilov Islands.

This is a very distinct species, and may at once be recognized by its very short stout bill, *orange-red legs and feet*, and dark mantle; the ground-colour of the primaries is also dark grey. I am indebted to the liberality of the authorities of the Smithsonian Institution for a fine specimen of this species, which is as yet rare in collections.

A variation in the hind toe and nail, similar to that in *R. tridactyla*, although in a smaller degree, is observable in this species. My own specimen has no claw on the right hind toe, and only a minute black speck on the left; of two others, from Alaska (e Mus. Salvin & Godman), the one has no hind nail whatever, whilst the other has small black nails, unequal in size, on both hind toes.

Genus LARUS.

4. LARUS GLAUCUS, Fabr.

Larus glaucus, O. Fabricius, Faun. Groenl. p. 100 (1780, ex Brunn.); Gm. Syst. Nat. i. p. 600 (1788); Scoresby, Arct. Voy. i. p. 535 (1820); Middendorff, Sib. Reise, ii. p. 241 (1853); Newton, Ibis, 1865, p. 509; Schlegel, Mus. P.-Bas, *Lari*, p. 4 (1863); Coues, B. N.W. Am. p. 620 (1874); Swinhoe, Ibis, 1874, p. 165 (Japan); Seebohm & H. Brown, Ibis, 1876, p. 453 (Lower Petchora); Dresser, B. of Europe, pts. lix., lx. (1877).

"*Larus giganteus*, Temm," Benicke, Ann. Wetterau. Gesellsch. iii. p. 140 (1814).

Larus leucereetes, Schleep, N. Ann. Wetterau. G. i. p. 314 (1819).

Larus consul, Boie, Wiedemann's Zool. Mag. p. 126.

Larus islandicus, Edmonst. Mem. Wern. Soc. iv. (1822) p. 185 (nec Edmonst. *op. cit.* p. 506 = *L. leucopterus*).

Larus glacialis, Macgill. Mem. Wern. Soc. v. pl. i. p. 270 (1824).

Leucus glaucus, Kaup, Natürl. Syst. p. 86 (1829).

"*Larus glacialis*, Benicke," Brehm; Vög. Deutschl. p. 732 (1831).

Larus hutchinsii, Richards. F. Bor.-Am. ii. p. 419, note (1831); Cassin, P. Philad. Ac. 1862, p. 290; Coues, *ibid.* p. 294; Elliot, B. N. Am. ii. pl. 53; Dall. & Bann. Tr. Chic. Ac. p. 304 (1869).

Plautus glaucus, Reich. Nat. Syst. Av. Longip. p. 5 (1852); *Id.* Av. pl. 47. fig. 316-318, pl. 50. fig. 2640.

Glaucus consul (Boie), Bruch, J. f. Orn. 1855, p. 101.

Laroides glaucus, Bruch, J. f. Orn. 1855, p. 281.

Hab. Arctic regions; seldom breeding much to the south of the arctic circle. In winter it goes southwards, and has been known to straggle as far as the Mediterranean, to Long Island on the Atlantic coast of America, also on to the coasts of Japan, whence I have seen specimens obtained at Hakodadi by Capt. Blakiston.

L. hutchinsii I consider to be an immature *L. glaucus* in the stage where the mottled brown of immature plumage has passed away, and the pearl-grey mantle has not yet begun to show. This stage lasts but a short time, which will account for the fact that this supposed species has so rarely been obtained; but I have always observed in young specimens in captivity that at this stage they are nearly, and sometimes quite, white. A fine example in this state, obtained off Japan by Capt. St. John, H.M.S. 'Sylvia,' is in the Marquis of Tweeddale's collection. Mr. Collett obtained one in Norway in September 1871; and several have been recorded from America.

The feet and legs in adults of this Gull are *bright flesh-pink*, and not lemon-yellow as depicted by an extraordinary freak of the colourist in Mr. Dresser's 'Birds of Europe.'

5. *LARUS LEUCOPTERUS*, Faber.

Larus argentatus, E. Sabine, Tr. Linn. Soc. xii. p. 546 (nec auctt.).

Larus leucopterus, Faber, Prod. Isl. Orn. p. 91 (1822); Sw. & Rich. F. Bor.-Am. ii. p. 418 (1831); Schl. Mus. P.-Bas, *Lari*, p. 5 (1863); Dall. & Bann. Tr. Chic. Ac. i. 1869, p. 304 (Alaska and Lower Yukon); Coues, B. N.W. Am. p. 622 (1874); Dresser, B. of Europe, pt. xlix (1876).

"*Larus glaucoides*, Temm." Meyer, Taschenb. iii. p. 197 (1822); Boie, Isis, 1822, p. 562.

Larus glaucoides, Temm. Pl. Col. 77^e livr. Introd. *Larus* (1828).

Larus islandicus, Edmonst. Mem. Wern. Soc. iv. p. 506 (1823) (nec Edmonst. *op. cit.* p. 185).

Larus arcticus, Macgill. Mem. Werner. Soc. v. no. xiii. p. 268 (1824) (large specimen).

Larus minor, Brehm, Vög. Deutschl. p. 736 (1831).

Laroides glaucoides, Brehm, *op. cit.* p. 744.

Laroides leucopterus, Brehm, *op. cit.* p. 745; Bruch, J. f. Orn. 1855, p. 281.

Laroides subleucopterus, Brehm, *op. cit.* p. 746.

Glaucus leucopterus, Bruch, J. f. Orn. 1853, p. 101.

Glaucus glacialis, Bruch, *op. cit.* p. 101.

Larus chalcopterus, Licht. Nomencl. Av. Mus. Berol. p. 99 (1854), sine descr. (type examined, H. S.).

? *Laroides chalcopterus* (Licht.), Bruch, J. f. Orn. 1855, p. 22.

Laroides glacialis, Bruch, *op. cit.* 1855, p. 282.

Leucus chalcopterus, Bp. Consp. Av. ii. p. 216 (1857).

Leucus arcticus, Bp. *op. cit.* p. 216.

Leucus leucopterus, Bp. *op. cit.* p. 217.

Hab. Even more thoroughly arctic, during the breeding-season, than *L. glaucus*; straggling southward in winter as far as the coast of France. It is not even authenticated as breeding in Iceland or Spitzbergen; but it does so within the arctic circle from Greenland to Behring's Straits. It also breeds in Alaska; and I have examined a specimen which was obtained in Japan by Capt. Blakiston.

6. *LARUS GLAUCESCENS*, Licht.

Glaucus glaucescens (Licht.), Bruch, J. f. Orn. 1853, p. 101 (type examined, H. S.).

"*Glaucus glaucopterus*, Kittlitz," Bruch, J. f. Orn. 1853, p. 101.

Larus glaucopterus, Licht. Nomencl. Av. Mus. Berol. p. 99, sine descr. (1854), Behring's Straits, Chamisso (type examined, H. S.).

Laroides glaucescens, Bruch, J. f. Orn. 1855, p. 281.

Leucus glaucescens, Bp. Compt. Rend. xlii. (1856) p. 770; Consp. Av. ii. p. 216 (1857).

Larus glaucescens, Licht.; Lawr. B. N. Am. p. 842 (1858); Coues, Proc. Philad. Ac. 1862, p. 295; id. B. N.W. Am. p. 622; Swinhoe, Ibis, 1874, p. 165 (Japan).

Larus chalconotus, Lawr. B. of N. Am. p. 843, 1860; Coues, Proc. Philad. Ac. 1862, p. 295 (nec Licht.).

Hab. Pacific coast of North America up to Behring's Straits, and, on the Asiatic side, Kamtschatka, and as far south as Hakodadi, Japan, whence I have seen a specimen obtained by Capt. Blakiston.

This apparent link between the large Gulls with white primaries and those with barred primaries may be roughly described as a Herring-Gull with the black portion of the primary-pattern nearly washed out. It is quite unmistakable. The changes of plumage in its progress to maturity show, however, that its relationship to *L. glaucus* is closer than to *L. argentatus*.

7. *LARUS ARGENTATUS*, Gm.

Larus fuscus, Penn. Brit. Zool. ii. p. 131 (1768), nec Linn.; Mont. Orn. Dict. i. (1802).

Larus argentatus, Gm. Syst. Nat. i. p. 600 (1788), ex Brünn.; Schl. M. P.-Bas, *Lari*, p. 16 (includes allies); Gundlach, J. f. Orn. 1857, p. 236 (Cuba); B. du Bocage, Journ. Soc. Lisb. 1868, pp. 149, 330 (Angola); Hartlaub, Syst. Orn. W.-Afrik. p. 251 (1857), Senegal; Dresser, B. of Europe, pt. xxii. (Oct. 1873); Coues, B. N.W. Am. p. 625, 1874.

Larus marinus, var. β , Latham, Ind. Orn. ii. p. p. 814 (1790).

Larus glaucus, Retzius, F. Suec. i. p. 156 (1800), nec Brünn.; Meyer & W. Taschenb. ii. p. 471 (1810).

Larus cinereus, Leach, Syst. Cat. Brit. Mus. p. 40. (1816).

Larus argentatoides, Brehm, Beitr. Vögelkunde, iii. pp. 791, 799 (1822).

Larus argenteus, Macgill. Mem. Wern. Soc. v. p. 264 (1824).

"*Larus argentatoides* (Bonap.)," Sw. & Richards. F. Bor.-Am. Birds, p. 417 (1831), nec Brehm, nec Bonap.

Laroides major, *argentatus*, *argenteus*, *argentatoides*, et *argenteus*, Brehm, Vög. Deutschl. pp. 738-743 (1831).

Glaucus argentatus, Bruch, J. f. Orn. 1853, p. 101.

Glaucus argentatoides, Bruch, *op. cit.* p. 101.

Larus marinus, Gundl. J. F. Orn. 1857, p. 236; Lembeye, Aves, de Cuba, p. 122 (1850), cf. Gundl. J. f. Orn. 1871, p. 291.

Larus smithsonianus, Coues, Pr. Ac. N. Sc. Philad. 1862, p. 296 (North America).

In this species the amount of white on the primaries increases with the age of the individual. Mr. Dresser (B. of Europe, xxii. *L. argentatus*, p. 3) describes an adult male from the Orkneys in summer, in my collection, as having "the outermost primary almost entirely blackish, white towards the tip, and crossed by a subapical black band; the next two grey at the base, black towards the tip, being finally terminated by a large white spot." This is correct, so far as any breeding bird with unspotted pearl-grey mantle may be termed *adult*; but the example in question is far from being an *old* bird. Bearing in mind that the *extreme* white tip diminishes by abrasion with the age of the *feather*, the following are the patterns of the outer primaries with the increasing age of the bird:—On the outer primary the white spot, or "mirror," absorbs the black bar till the latter wholly disappears, leaving the primary pure white from the tip to more than two inches upwards; whilst from above, a grey "wedge" along the inner web gradually eats into the black portion, reducing the width of the black along the inner web to only two inches. In the second primary a white "mirror" appears, which also increases with the age of the bird; but in this feather, so far as I have yet seen, it does not wholly absorb the black bar and unite with the white tip; what it does, however, is to eat round the black above it, so as to cut off the black from the inner web, and thus unites with the grey wedge, which has been gradually increasing its dimensions downwards. It is needless to give a minute description of the remaining primaries; it will suffice to say that, as a rule, the encroachment of the light portions upon the dark ones increases with the age of the bird, and there may easily be stages of further progression with which I am not yet acquainted. This grey "wedge" on the upper portions of the primaries should be borne in mind, as it is an important distinction between some closely allied species. These observations equally apply to the Yellow-legged Herring-Gull (*L. cachinnans*) and to the American bird which Dr. Coues formerly distinguished as *L. smithsonianus*. Dr. Coues, although he has given it up as a species, even now maintains (B. of N.W. Am. p. 628) that if a subapical spot (or "mirror") is present on the second primary of the American bird, it is small; but in two examples before me, of the correctness of whose locality I am well assured, the one from Grand Manan, in June, has it well developed, whilst in another, from Long Island, the mirror extends right across the feather, and on the inner web has nearly eaten through the black and effected a junction with the grey wedge above. Indeed only one European bird in my collection has the mirror still more developed. The average of American *may* possibly be a little larger than the average Old-World specimens; but I have not examined a sufficient series of the former to speak with the same confidence upon this point that Dr. Coues does; at any rate that difference is admittedly unworthy of specific distinction. The *mantle* in the true adult *L. argentatus* is, as every one knows, *pearl-grey*, the *legs and feet* being *flesh-coloured*; and the *ring outside the eye* is of a *pale yellow*. Taking

these as the characteristics to distinguish it from its congeners, its range may be defined as the north-west of Europe from the Varanger Fiord, the Baltic, the western coasts down to North Africa, the Azores (where it breeds), Madeira, and the Canaries (*Godman*). To Greenland it is a very rare straggler; but it was obtained at Winter Islands, near Melville Peninsula, occurs in Hudson's-Bay territory as far as the Mackenzie River, and probably reaches right across to the Pacific coast, where it certainly occurs, a specimen from Kodiak, collected by Wosnesensky, in the St.-Petersburg Museum, being, as Mr. Seeböhm informs me, much lighter in the mantle than *L. cachinnans*; and several specimens from the west coast of Mexico are in my collection. Dall and Bannister also record what seems to be this species from Alaska and from the Upper Yukon. There can be no doubt that examples from northern latitudes have a somewhat lighter mantle than those from more temperate regions, although the transition is very gradual; and this light form has received the name of *L. argentatoides*. From Labrador this species ranges down the coast and along the great rivers and inland lakes as far as Texas; it also visits Cuba and Bermudas. Prof. Barboza du Bocage, in his "List of Birds in the Lisbon Museum" (J. f. Orn. 1876, p. 291), cites an example obtained on the Angola coast, and another at Porto Alexandre, Benguela, more than 15° south of the equator, and in the latitude of the island of St. Helena. This is indeed an extension of its range, provided there is no error in the identification of the specimens.

8. *LARUS CACHINNANS*, Pall.

Larus cachinnans, Pallas, Zoogr. Ross.-As. ii. p. 318 (1811).

Larus argentatus, Bp. Iconogr. F. Ital. Uccelli, Introd. (1832-41); Middend. Sib. Reise ii. p. 242 (part.), (1853); Schlegel, Mus. Pays-Bas, *Lari*, p. 17 (part.), 1863; Blasius, J. f. Orn. 1865, p. 380 (part.); Hume, Yarkand Exp. Zool. p. 299 (1873), Kashmir; id. Stray Feath. i. p. 270 (1873), Scinde.

Larus cachinnans, Pall.; v. der Mühle, Orn. Griechenl. p. 143 (1842).

Glaucus leucophæus, (Licht.) Bruch, J. f. Orn. 1853, p. 101 (Red Sea).

Glaucus michahellesii, Bruch, *tom. cit.* p. 101.

"*Glaucus borealis*, Brandt," Bruch, *tom. cit.* p. 101.

Laroides michahellesii, Bruch, *op. cit.* 1855, p. 282.

Laroides cachinnans, (Pall.), Bruch, *tom. cit.* p. 282.

"*Laroides borealis*, (Brandt)" Bruch, *tom. cit.* p. 282.

Larus epargyrus, Licht. Nomencl. Av. Mus. Berol. p. 99 (1854), sine descr. (type examined, H. S.).

Larus leucophæus, Licht. Nomencl. Av. Mus. Berol. p. 99 (1854), descr. nulla (type examined, H. S.); Salvadori, Cat. Ucc. Sard. p. 129 (1864); Finsch & Hartl. Vög. Ost-Afrik. p. 818 (1870); Dresser, B. of Europe, pt. xxii. (Oct. 1873).

Laroides leucophæus, Bp. Naumannia, 1854, p. 212; id. Consp. ii. p. 219 (1857).

Larus fuscescens, Selater, P. Z. S. 1867, p. 315, et Rev. List of Vert. (1872), p. 316.

? *Larus fuscescens*, Licht.; Bruch, J. f. Orn. 1853, p. 100, (part.). One of the two specimens so labelled in the Berlin Museum is of this species; the other is a *L. fuscus*.

After much consideration and the examination of a very large series of specimens from various localities, I have come to the conclusion that this form, or species, is sufficiently distinct to be treated apart from *L. argentatus*. The distinguishing characteristics of *L. cachinnans* are the darker mantle, yellow legs and feet, and the deep orange-red ring round the outside of the eye. These colours are naturally much more apparent in life than in dried skins; but the colour of the mantle is enough to enable any one with an ordinary perception of shades to separate the two birds at a glance. In the pattern of the primaries, and in the individual variations in size both are alike. With regard to the name which I have adopted, it seems to me that there cannot be the slightest doubt as to the species Pallas meant by his *Larus cachinnans* from the Caspian and the Steppes: he describes it fully; and, to avoid any ambiguity as to the shade of colour of the mantle, he uses precisely the same term that he does for the mantle of *L. ichthyaëtus*, which exactly suits this species, whilst it is too dark for *L. argentatus*, and too light for *L. affinis*. Yet more, my friend Mr. Seebohm, on his return from Siberia, examined the *Larinæ* in the St.-Petersburg Museum; and, thanks to him, I am able to state from absolute comparison that *L. cachinnans*, and *L. leucophæus* of the Mediterranean are the same, Pallas's name having the priority.

It appears, indeed, to be a form which, whether from living in a more brilliant atmosphere, or from frequenting inland seas as distinct from great oceans, or from other causes with which we are not acquainted, has acquired a greater intensity of coloration than its congener; but it is not altogether easy to indicate its precise range. The most northern example that I have examined is from Havre, an adult male, the oldest, to judge by the primaries, of any grey-backed gull in my collection; so that it appears to straggle up the French coast. It is not, however, till the Mediterranean is reached that *L. cachinnans* replaces *L. argentatus*; thence it ranges throughout that inland sea, breeding on its shores and islands; goes up the Black Sea, across the steppes and the low-lying marshy and salt-lake districts of Russia from the mouths of the Volga and the shores of the Caspian, as far as Vologda, across the Ural river and the Kirgish steppes, to the Irtych and as far as Lake Baikal. The above seems to be, roughly, its breeding-range; for Meves's description of the "*L. cachinnans*" obtained at Cholmogory on the Dwina applies better to the next species: it was so dark in the mantle that he at first took it to be *L. fuscus*. The species found in Kashmir by the Yarkand expedition was probably *L. cachinnans*. It goes down the Red Sea, and in winter visits the Persian Gulf, and the Mekran coast as far as Kurrachee. It is also found along the coasts of China and Japan in winter, and is the species recorded by Swinhoe under the

names of *L. cachinnans* and *L. occidentalis*; but his birds are most decidedly not the true *L. occidentalis* of Audubon, which has never as yet been obtained anywhere on the Asiatic shores. All Asiatic birds show very distinctly the grey wedge in the outer primaries, which *L. occidentalis* never does: besides, their mantles are not nearly dark enough for that species. I possess, or have examined, a large series of specimens from almost all the localities I have indicated, and have taken very little from descriptions; indeed it is necessary to rely in this matter on one's own observations, as the confusion respecting this group is inconceivable to any one who has not studied the question. In Japanese and Chinese specimens, all obtained in winter, my collection is especially rich, owing to the efforts of Capt. St. John, of H.M.S. 'Sylvia,' and Lieut. Stanley Muggeridge, of H.M.S. 'Kestrel;' Professor Taczanowski has sent me specimens from Lake Baikal, and Mr. W. Muloch and Mr. Blanford examples from Kurrachee and the Mekran coast, whilst as regards Russia and the Mediterranean Mr. Seebohm's and other collections have been available. I may observe that I think it quite possible that in individuals from more northern localities the feet may not be so distinctly *yellow* as in examples breeding in the Mediterranean, believing, as I do, that certain atmospheric conditions exercise a considerable effect upon coloration.

9. *LARUS AFFINIS*, Reinh.

Larus affinis, Reinhardt, Vidensk. Meddel. 1853, p. 78, et Ibis, 1861, p. 17 (type examined, H. S.); Seebohm and H. Brown, Ibis, 1876, p. 452.

Larus argentatus (partim), Midd. Sib. Reise, ii. p. 242. (The description of the bird from Sea of Okhotsk clearly applies to this species.)

Larus cachinnans, Licht. Nomencl. Av. Mus. Berol. p. 99, nec Pallas (specimens examined, H. S.).

Larus fuscus, Jerdon, B. of India, ii. p. 830 (1864).

Larus cachinnans, Meves, Öfv. k. Vetensk. Ak. Förh. 1871, p. 786 (Cholmogory); Heugl. Orn. N.O.-Afr. Bd. 2. Abth. ii. p. 1392 (nec Pallas).

Larus, sp.? No. 39, Heuglin (nec Pallas), Ibis, 1872, p. 65 (Novaya Zemlia and Waigats): description can only apply to this species.

Larus occidentalis, Hume, Stray Feath. 1873, p. 273 (nec Audub.).

Larus heuglini, Bree, B. Eur. 2nd ed. v. p. 58 (1876).

Professor J. Reinhardt, of Copenhagen, was the first to discriminate and to confer a name upon an individual of this species which had straggled to Greenland; but for a knowledge of its habitat and distribution we are indebted to Messrs. Seebohm and Harvie Brown, who found it breeding upon the Petchora, where, however, it only comes about 11th May, and retires southward on the approach of winter. The series of specimens brought home by these energetic naturalists threw a light upon many points which had hitherto been obscure, and showed the real position of numerous specimens from

the Red Sea and the Beloochistan coast, which had formerly been a great trouble, most of them being in immature plumage, and not suiting either *L. cachinnans* or *L. fuscus*.

Mr. Hume's description of the pattern of the primaries of the birds found in winter about Kurrachee (Stray Feathers, 1873, p. 273) shows clearly that his *L. occidentalis* is this species, and by no means the true American bird, the occurrence of which, as I have said before, has never yet been authenticated on the coasts of Asia.

Heuglin's dark-mantled bird from Novaya Zemlia is clearly *L. affinis*; and Middendorff's description of a variety of *L. argentatus* found round the southern shores of the Sea of Okhotsk also applies to this species.

It may appear strange at first sight that this species should have been first described from Greenland; but that is merely due to the unusually careful attention which the fauna of that country has received from Dr. Reinhardt, whose watchful eyes not even a straggler could escape. I have examined the type, and am satisfied that it is of this species. It connects with *L. fuscus* rather closely (although quite distinct) in the length of its foot as compared with that of the tarsus, it having a proportionally smaller foot than either *L. argentatus*, *L. cachinnans*, or *L. occidentalis*, but larger than *L. fuscus*. From the last it may also be distinguished by its larger size and the distinct "pattern" of the outer primaries, the grey wedge being quite marked in this species, whilst it is absent in the outer feather of *L. fuscus*. The mirror on the second primary is moreover only to be found in very old birds (not one of thirteen breeding-birds obtained on the Petchora had it); whilst in old *L. fuscus* this mirror is always present. The present species is in fact a Herring-Gull which passes the whole of the year in a brilliant atmosphere; and I cannot help thinking that to this, and to other conditions of existence with which we are as yet unacquainted, its intensity of coloration is mainly attributable.

10. LARUS OCCIDENTALIS, Audubon.

Larus occidentalis, Aud. Orn. Biogr. v. p. 320 (1839); Lawr. B. of N. Am. p. 845 (1858); Elliot, B. N. Am. ii. pl. lii.; Coues, P. Ac. N. S. Philad. 1862, p. 296; Schl. M. P.-Bas, *Lari*, p. 15 (1863).

Glaucus occidentalis, Bruch, J. f. Orn. 1853, p. 101.

Laroides occidentalis, id. *op. cit.* 1855, p. 282; Bp. Cousp. Av. ii. p. 219 (1857).

Larus argentatus, var. *occidentalis*, Coues, Key N. Am. Birds, p. 312 (1872); id. B. of N.W. Am. p. 633 (1874).

Larus fuscus?, Saund. P. Z. S. 1875, p. 158 (Lower California).

Hab. Pacific coast of North America down to Magdalena Bay, Lower California.

It seems to me that this is a very recognizable form, and fully deserving of consideration as a species. Its nearest ally is, on the whole, *L. affinis*; but in the wing-pattern the grey wedge is absent in

the two outer primaries; and their ground-colour is rather darker than in most examples of *L. fuscus*. In the colour of the mantle many specimens are quite as dark as *L. fuscus*, especially those from Southern California, one of which I should have referred to that species but for its long coarse foot; for at that time I had only northern specimens of *L. occidentalis* available, and these are considerably lighter on the mantle and in general tint. Since then I have had the opportunity of inspecting more examples and of knowing the species better; and it seems to me that its *large deep bill* will generally, and its *large coarse foot, longer than the tarsus*, will always, suffice to separate it from *L. fuscus*, which has a delicate foot, much shorter than the tarsus. As a rule *L. occidentalis* is a stouter bird; but some males of *L. fuscus* from the south of Europe run very long in the wing and as large in the bill, whilst on the other hand the Magdalena-Bay *L. occidentalis* is a female, and has an unusually slender bill. In one example I have found a tiny sub-apical spot on the second primary on one side, but not on the other; so that it is probably a mark of extreme age; but in fully adult *L. fuscus* this is common. Although I have laid stress upon the characters which distinguish this Gull from *L. fuscus*, yet it is rather more closely related to the Herring-Gull group, as shown by its generally larger size, stout bill, and large feet, which are flesh-coloured in this species, although, as in many other cases, they are sometimes rather yellow when dried.

11. *LARUS FUSCUS*, Linn.

Larus fuscus, Linn. Syst. Nat. i. p. 225 (1766); Scop. Ann. i. Hist. Nat. p. 80 (1769); Gmel. Syst. Nat. i. p. 599 (1788); Lath. Ind. Orn. p. 815 (1790); Temm. Man. d'Orn. p. 496 (1815); Schl. M. Pays-Bas, *Lari*, p. 15 (1863); Finsch & Hartl. Vög. Ost-Afr. p. 820 (1870); Sharpe and Dresser, B. of Europe, pt. xvi. (February 1873).

Larus flavipes, Meyer, Tasch. Vög. Deutschl. ii. p. 469, pl. front. (1810).

Larus cinereus, Leach, Syst. Cat. Mamm. &c., Brit. Mus. p. 401 (1816).

"*Larus argentatus*, Mont." Bewick, Brit. B. Supp. p. 39 (1821).

Leucus fuscus, Kaup, Natürl. Syst. pp. 86 and 196 (1829).

Laroides melanotos, harengorum et fuscus, Brehm, Vög. Deutschl. pp. 747-749 (1831).

Dominicanus fuscescens (Licht.) partim, Bruch, J. f. Orn. 1853, p. 100. Lichtenstein's example from Arabia is this species; the other bearing this name is *L. cachinnans* (specimens examined, H. S.).

Dominicanus fuscus (Linn.), Bruch, J. f. Orn. 1853, p. 100; id. op. cit. 1855, p. 281, including his *L. fuscescens* of 1853.

Clupearus fuscus, Bonap. Consp. Av. ii. p. 220 (1857).

"*Larus medius*, Hempr. & Ehr." in Mus. Berol. "Gumfudde." An immature specimen of this species, H. S.

Hab. The north of Europe, the Faroes, the Baltic, Russia as far east as Archangel, the British Islands, the French coast, and the

Canaries (probably its south-west breeding-limit, although it is known to go as far south as Senegal, whence I have examined specimens obtained in May). It visits the Portuguese and Spanish coasts, goes up the Mediterranean to the Black Sea, ascends the Nile to Nubia, and is found throughout the Nile country, whilst on the Red Sea, as far as Aden, it is stated to be sedentary (*Finsch & Hartlaub*). Jerdon's solitary immature specimen procured at Jaulna, in the Deccan, was probably *L. affinis*, the length of the wing (18 to 19 inches) being greater than that of any *L. fuscus* I ever saw, $17\frac{1}{4}$ inches being the very extreme for an old and fresh-moulted bird; and, indeed, Mr. Dresser gives only 15·7! Mr. Dresser states that Dybowski found it in Dauria; but Prof. Taczanowski, in his "Faune de la Sibérie Orientale" (Bull. Soc. Zool. de France, i.) does not mention it amongst that traveller's collection; and with regard to the quotation by the above author of Mr. Swinhoe's authority for its occurrence on the coast of China, a reference to the revised "List of the Birds of China," P. Z. S. 1871, p. 421. no. 656, shows that the species referred to ('Ibis,' 1860, p. 68) as *L. fuscus* was really *L. crassirostris*, Vieill. (*L. melanurus*, Temm.), thus considerably circumscribing the eastern range attributed to it. As regards America, Dr. Coues considers that there is no good evidence of its occurrence on the coasts of the United States.

The distinguishing characteristics of the adult of this species are its dark slate-coloured mantle, chrome-yellow legs and feet, and the shortness of the foot as compared with the tarsus. The outer primaries are very dark, and may be termed black, with a subapical patch or mirror on the first; and in *old* birds there is a *small* mirror on the second primary; but even in these there is *no sign* of the *grey wedge* on the *upper part* of the *inner web* of the *outermost*, scarcely so on the second, and but rarely even on the third—a marked difference from the *L. argentatus* group. In *L. fuscus* the inner web merely fades into a lighter shade towards the edge; and this dark ground of the primaries, and the absence of distinct "pattern," coupled with its average smaller size, and especially the smaller foot, will generally be sufficient to distinguish it from either *L. affinis* or *L. occidentalis*. But for the large coarse foot, I should have assigned a specimen of *L. occidentalis*, from Magdalena Bay, California, to this species; for at the time I had never seen so dark a form of the American bird. In shade of mantle there is much variation, some being in this respect quite as light as *L. affinis*, whilst the blackest are Egyptian specimens, in which the yellow feet are also brightest, probably due to climatic influences. These very dark birds when old have certainly a white subapical spot on the second primary, although Blasius imagined that this was confined to northern and lighter-mantled birds. The examples which run closest to *L. affinis* are some from Malaga and Tangiers, two of which I have with the subapical spot on the second primary, showing considerable age; but even with these the difference between them and *L. affinis* is very marked, *L. affinis* having the grey wedge so much more defined. The adults, therefore, are quite distinguishable; but some years ago,

before Messrs. Seebohm and Harvie Brown's explorations on the Petchora had made me acquainted with a series of *L. affinis*, I was much puzzled by Mr. W. Blanford's immature birds from the Baluchistan coast, obtained in December 1871 to January 1872, and I led him into the error of ascribing them to *L. fuscus*. By my note-book of specimens examined I find that I was in much doubt even at that time, owing to their size and the relative dimensions of the feet and tarsi; but according to my lights I could then ascribe them to nothing else. I now consider them to have been *L. affinis*.

12. *LARUS CALIFORNICUS*, Lawr.

? *Larus niveus*, Pall. Zoogr. Rosso-As. ii. p. 320, pl. 86 (1811), (Kamtschatka), nec Bodd. T. Pl. Enl. 994 (1783).

? *Laroides americanus*, Brehm, Vög. Deutschl. p. 743 (1831).

Larus californicus, Lawr. Ann. Lyc. New York, vi. 1854, p. 79; id. Birds N. Am. p. 846 (1858); Coues, Pr. Ac. N. S. Phil. 1862, p. 300; id. B. of N.W. Am. p. 634 (1874).

Laroides californicus, Bp. Consp. Av. ii. p. 220 (1857).

Larus delawarensis, var. *californicus*, Coues, Key N.-Am. B. p. 313 (1872).

Hab. Pacific coast of North America from Vancouver's Island to Lower California, and the interior as far as the vicinity of Great Slave Lake; also Japan coast, whence I have examined an adult specimen in the Marquis of Tweeddale's collection, obtained by Capt. St. John, H.M.S. 'Sylvia,' off Kali, Japan, in January 1872.

The name *L. niveus*, Pallas, is not available, having been previously employed by Boddaert for *Pagophila eburnea*; but I have long been of opinion that the bird described by Pallas under that name was really this species—a conviction strengthened by the sight of an undoubted example from Japan, proving that it does cross the North Pacific. It has generally been supposed to apply to a larger race of *L. canus*; but Pallas knew *L. canus* perfectly well, and he describes his *L. niveus* as a somewhat scarce visitor to the northern and Kamtschatkan seas, and not in the habit of going far up the rivers, also as "magnitudo corvi coracis." Now the largest *L. canus* could hardly be described as of the size of a Raven; and, except in the wing, which is proportionally long in that Gull, the other measurements are too large for it; but they exactly suit *L. californicus*, and Pallas's figure is a perfect portrait of a specimen recently sent to me through the kindness of the authorities of the Smithsonian Institution. Perhaps these remarks may assist in laying the ghost of that *Larus niveus* which for nearly a century has been haunting the lists of systematists.

Dr. Coues inserts with a ? *L. argentatoides*, Bonap. Synopsis, Ann. Lyc. Nat. Hist. New York, p. 360 (1828), as the earliest name for this species, whilst disavowing any desire to supersede Lawrence's title; but as the name had already been applied by Brehm in 1822 for *L. argentatus*, it could not be used for this species, even if correct. But Bonaparte says of his species:—"Common near New York and

Philadelphia; we have also shot it on the southern coasts of England." Now I am not aware of this species having been found within 2000 miles of New York; and the description and measurement (20 inches in length) suit *L. delawarensis*, the length of which Dr. Coues gives as 19.75 inches, better than any other. Dr. Coues goes on to identify *L. argentatoides* of Richardson with Bonaparte's species: but this cannot be; for Richardson's birds were from 23 to 25 inches in length, with a mantle of the same shade as the Iceland Gull—both too large and too light for *L. californicus*. Richardson got his bird at Melville Peninsula, and speaks of it as found at Hudson's Bay. Dr. Coues says the Smithsonian Institution possesses specimens "from localities not far distant from those of Richardson;" but it seems to me that Great Slave Lake is a very considerable distance from Melville Peninsula, although nearer to it than to New York. Dr. Coues gives the length of *L. californicus* as 20 inches; and as Richardson's 23 to 25 inches do not suit him, he quite gratuitously suggests that Richardson drew up his measurements from the largest specimens; whilst as for the colour of the legs, which are described as "flesh-coloured," whereas in *L. californicus* they are olivaceous, his assumption is that Richardson described them from dried skins! There can be very little doubt that Richardson's birds were examples of *L. argentatus*; for his measurements and descriptions suit that species better than any other.

I am glad to see that Dr. Coues, in his 'Birds of North-West America,' has reconsidered his previous hasty determination that this species was merely a large variety of *L. delawarensis*. To judge from the examples I have examined, *L. californicus*, although certainly the connecting-link between the *L. argentatus* and the *L. canus* group, is perfectly distinct from either. In the pattern of the primaries it rather goes with *L. argentatus*, in the colour of the soft parts with *L. delawarensis*; in the colour of the mantle it is much darker than either, though not so dark as *L. occidentalis*.

13. LARUS DELAWARENSIS, Ord.

Larus delawarensis, Ord, Guthrie's Geogr., 2nd Am. ed., ii. p. 319 (1815) *vide* Lawr. B. N. Am. p. 846 (1858); Coues, B. of North-West Am. p. 636 (1874); Wheeler, Rep. Exp. and Surv. W. of 100th Mer. p. 485 (1876); Reid, Zoologist, 1877, p. 489 (Bermudas).

Larus canus, Bp. Specchio Comp. p. 69 (1827), nec auctt.

? "*Larus argentatoides*, Brehm," Bp. Synopsis, p. 360 (1828), nec Brehm.

Larus zonorhynchus, Richardson, F. Bor.-Am. ii. p. 421 (1831); Audubon, B. Am. viii. p. 35, pl. 446 (1839); Schlegel, Mus. P.-Bas, *Lari*, vi. p. 22 (1863); Blasius, J. f. Orn. 1865, p. 380; Bp. Consp. Av. ii. p. 224 (1857); Gundlach, J. f. Orn. 1857, p. 236 (Cuba).

Glaucus zonorhynchus (Rich.), Bruch, J. f. Orn. 1853, p. 102.

"*Glaucus occidentalis* (Audub.)," Bruch, J. f. Orn. 1853, p. 101, taf. ii. fig. 20, nec Audubon.

Gavina zonorhynchus (Richards.), Bp. Naum. 1854, p. 212; Bruch, J. f. Orn. 1855, p. 282.

Gavina bruchi, Bp. Naumann. 1854, p. 212; Bruch, J. f. Orn. 1855, p. 283.

"*Laroides occidentalis* (Audub.)," Bruch, J. f. Orn. 1855, p. 282, nec Audubon

Larus zonorhynchus, var. *mexicanus* et var. *bruchi*, Bp. Consp. Av. ii. p. 224 (1857).

Hab. Interior and coasts of North America from the Saskatchewan and Labrador to Great Salt Lake (breeding), and in winter to the middle and southern States, Cuba, and the Bermudas. An immature bird in my collection obtained by Mr. H. Whitely at Hakodadi, Japan, 14th December, 1864, seems from its size and stout barred bill to belong to this species.

The adult is easily distinguished from *L. canus* by its larger size, stout, double-zoned bill, and lighter mantle; it is smaller than *L. californicus*, its wing-pattern is different, and the mantle is much lighter.

14. LARUS CANUS, Linn.

Larus canus, Linn. Syst. Nat. i. p. 224 (1766); Gm. Syst. Nat. i. p. 596 (1788); Schl. Mus. P.-Bas. *Lari*, p. 23 (1863); Sharpe & Dresser, B. of Eur. pt. xvii. (1873); David & Oust. Ois. de la Chine, p. 517 (1877).

Larus cinereus, Scop. Ann. i. Hist. Nat. p. 80 (1769).

Larus hybernus, Gm. Syst. Nat. i. p. 596 (1788).

Larus procellosus, Bechst. Orn. Tasch. p. 373 (1802).

Larus cyanorhynchus, Meyer, Tasch. Vög. Deutschl. ii. p. 480 (1810).

Laroides procellosus et *L. canescens*, Brehm, Vög. Deutschl. pp. 750-753 (1831).

Larus canus, var. *major*, Middendorff, Sib. Reise, ii. p. 243 (1853).

Larus heinei, Homeyer, Naumannia, 1853, p. 129.

Glaucus canus, Bruch, J. f. Orn. 1853, p. 102.

"*Glaucus lacrymosus* (Licht.)," Bruch, J. f. Orn. 1853, p. 102, nec Licht.

Gavina kamtschatchensis, Bp. Naumannia, 1854, p. 212.

Gavina heinei, Bruch, J. f. Orn. 1855, p. 283.

Gavina canus, id. op. cit. p. 284.

? *Rissa nivea*, Bp. Cat. Parzudaki, p. 11 (1855).

"*Larus niveus*, Pall," Bp. Consp. Av. ii. p. 224 (1857); Swinhoe, P. Z. S. 1871, p. 420; David & Oust. Ois. de la Chine, p. 518, 1877, nec Pallas.

Larus delawarensis, Coues, Pr. Ac. N. Sc. Phil. 1861, p. 246.

Larus canus major, Schl. Mus. P.-Bas. *Lari*, p. 26 (1863).

"*Larus suckleyi*, Lawr." Schl. M. P.-Bas. *Lari*, p. 27 (1863), nec Lawr. (Japan).

Larus audouini, Tristram, Ibis, 1868, p. 330, nec Payr.

Hab. Throughout the Palæarctic region, but very rare in Iceland; once in Labrador.

A specimen bearing the label of the Labrador Expedition of Dr. E. Coues and Mr. J. W. Dodge in 1860, obtained at Henley Harbour on the 21st August, and marked *L. delawarensis*, came into my hands indirectly from Mr. Krider, of Philadelphia. I have very little doubt as to its being really *L. canus*; but the American naturalists will have an opportunity of disputing or confirming my view, as I have sent it to the Smithsonian Institution.

Few species differ so much in individual size as *L. canus*; and I cannot admit the specific validity of the large race found throughout Northern Russia and Siberia. Off Japan all sizes are found; and the colour of the mantle is also very variable, being lightest in Scotch breeding-birds. It appears to be a species which attains its greatest development in the north and east, and deteriorates in size as it ranges south and west. I have already pointed out that I consider *L. niveus* of Pallas to be really the earliest name of *L. californicus*, Lawr.

15. *LARUS BRACHYRHYNCHUS*, Rich.

Larus canus, Richardson, F. Bor.-Am. ii. p. 420 (1831), nec Linn. nec auctt. (adult).

Larus brachyrhynchus, Rich. F. Bor.-Am. ii. p. 421 (1831), juv. (nec Gould, P. Z. S. 1843), type described, Great Bear Lake, May 23rd, 1826; Coues, P. Ac. N. S. Philad. 1862, p. 302; Elliot, B. N. Am. ii. pl. 53; Dall & Bann. Tr. Ch. Ac. 1869, p. 305.

Larus suckleyi, Lawr. Ann. Lyc. New York, 1854, p. 264; id. B. N. Am. p. 847 (1858); Schl. M. P.-Bas, *Lari*, p. 27 (1863).

Rissa septentrionalis, Lawr. Ann. Lyc. New York, 1854, p. 266; id. B. N. Am. p. 854 (1858).

Larus canus, var. *brachyrhynchus*, Coues, Key N. Am. B. p. 313 (1872); id. B. N. W. Am. p. 638 (1874).

Hab. North-Pacific coast of America, from Sitka downwards, and the interior to Great Bear Lake.

I can refer to no other species the specimens obtained by the late Mr. Hepburn at San Mateo, California, and one very old and fresh-moulted bird in the Copenhagen Museum from Sitka. They are certainly not *L. delawarensis*; and they are smaller than any *L. canus* in my collection except one, a quite abnormally small female from Orkney. The bill is slender and weak; and the foot with the middle toe and nail is nearly as long as the tarsus, which in *L. canus* is considerably longer. The bill is olive-green to mandible, in front of which it is yellow, the former colour being much more predominant than in old *L. canus*. There is much more grey from the base of the primaries downwards than in *L. canus*; and on the third primary the wedge descends to the level of the tip of the fifth primary, whilst there is a broad subapical mirror on the third primary, which, again, is seldom, if ever, the case in *L. canus*; also the ends of the primaries are much more broadly tipped with white.

So far, I think, I am in accord with Dr. Coues, who has had the advantage of examining Richardson's type, which, however, is a young bird; but as regards the adult, of which he has seen far more

examples than I have, there is a slight discrepancy to be explained. He says that the colour of the mantle of *L. brachyrhynchus* is rather *lighter* than in *L. canus*; my specimens are certainly rather *darker* than the darkest *L. canus*. Perhaps this is a slip of the pen, or an inversion of his reference; otherwise I cannot understand it. I retain this species as it has already been described, because the specimens before me have a general appearance so different from *L. canus* that they are distinguishable at a glance, although it is rather difficult to define the differences on paper; but I expect that a larger series will throw light upon the subject. Schlegel's bird from Japan assigned to this species seems to me to be merely a large *L. canus*.

16. LARUS AUDOUINI, Payr.

? *Larus quadricolor*, Scop. Ann. i. Hist. Nat. p. 81. no. 109 (1769).

Larus audouini, Payraudeau, Ann. Sc. Nat. viii. p. 462 (1826); Temm. Pl. Col. livr. 81, pl. 480 (1826); Gould, B. Europe, v. pl. 438 (1837); Schl. M. P.-Bas, *Lari*, p. 22 (1863); Degl. & Gerbe, Orn. Europ. ii. p. 420 (1867); Lilford, Ibis, 1875, p. 31.

Larus payraudei, Vieill. Faun. Franç. Ois. p. 396 (1828), fide Deg. & Gerbe, *loc. cit.*

Gavia audouinii (Payr.), Boie, Isis, 1844, p. 191.

Glaucus audouini (Payr.), Bruch, J. f. Orn. 1853, p. 102.

Gavina audouini (Payr.), Bp. Naum. 1854, p. 212; Conspr. Av. ii. p. 222 (1857).

Laroides audouini (Payr.), Bruch, J. f. Orn. 1855, p. 282; Brehm, Naum. 1855, p. 294.

Hab. Mediterranean, especially about Corsica and Sardinia, and the neighbouring coasts of Italy, the Balearic Islands, and North Africa. Mr. Gould quotes Natterer (*in litt.*) as having shot three specimens outside the Straits of Gibraltar, between that place and Tarifa. Lord Lilford found it breeding on the island of Toro, off Sardinia. Canon Tristram's reputed *L. audouini* from Palestine are all *L. canus*.

This Gull is one of the most unmistakable species, owing to its length of wing, dark primaries, lead-coloured or black legs, and, when adult, its cherry-red double-zoned bill. From the description given by Scopoli of his *L. quadricolor* it is probable that it is this species; but in the absence of certainty it is undesirable to use that name.

17. LARUS MARINUS, Linn.

Larus marinus, Linn. Syst. Nat. i. p. 225 (1766); O. Fabr. Faun. Grœnl. p. 102 (1780); Meyer, Taschen. Vög. Deutschl. pl. ii. p. 465; Temm. Man. d'Orn. p. 490 (1815); Macgill. M. Wern. Soc. vol. v. p. 255 (1824); Schlegel, M. Pays-Bas, *Lari*, p. 10 (1863); Sharpe and Dresser, B. of Eur. pt. xv. (1872); Cones, B. of North-West (America), p. 624 (1874); Swinhoe, Ibis, 1874, p. 165 (Japan); Reid, Zoologist, 1877, p. 489 (Bermudas).

Larus naevius, Linn. Syst. Nat. p. 225 (1766).

Larus maculatus, Bodd. Tab. Pl. Enl. p. 16 (1783).

Larus maximus, Leach, Syst. Cat. Brit. Mus. p. 40 (1816); Brehm, Vög. Deutschl. p. 728 (1831).

Leucus marinus, Kaup, Natürl. Syst. pp. 86, 196 (1829).

Larus mülleri, Brehm, op. cit. p. 729 (1831).

Larus fabricii, id. op. cit. p. 730 (1831).

Dominicanus marinus, Bruch, J. f. Orn. 1853, p. 100; id. ib. 1855, p. 280.

Larus albus, P. L. S. Müller, Natursystem, p. 108 (1776), has generally been quoted by copyists as a synonym of this species; but investigation shows that it is based upon Buffon's "Mouette cendrée tachetée" (vol. vii. p. 424; Pl. Enl. 387), which represents a young *Rissa tridactyla*.

Hab. Northern and temperate Europe and Iceland (breeding); visiting the Mediterranean in winter, as far as Greece; the Canaries, and probably the Azores. In Northern Greenland Prof. Reinhardt assures me that it is very rare; it breeds in Labrador, occurs on the great lakes of North America, and visits Florida in winter. Lem-beye's specimen, recorded from Cuba, turned out to be *L. argentatus* (vide J. f. Orn. 1871, p. 290); but it has occurred at the Bermudas (*Reid*). No record from the American side of the Pacific; but I have examined undoubted specimens from Japan collected by Capt. Blakiston. This is a very great extension of its previously known range.

18. LARUS DOMINICANUS, Licht.

Larus dominicanus, Licht. Verz. Doubl. p. 82 (1823); Darwin, Zool. "Beagle," Birds, p. 142 (1841); Cassin, Orn. U.S. Expl. Exp. p. 377 (1858), Callao?; Schlegel, M. P.-Bas, *Lari*, p. 12 (1863); Layard, B. S. Africa, p. 367 (1867); Durnford, Ibis, 1877, p. 45 (Chuput, Patagonia); id. tom. cit. p. 201 (prov. B. Ayres).

Larus littoreus, Forster, Descr. Anim. p. 46 (1844), Cape of Good Hope.

Larus antipodus, Gray, Cat. *Anseres* Brit. Mus. p. 169 (1844), New Zealand.

Dominicanus antipodus, Bruch, J. f. Orn. 1853, p. 100.

"*Dominicanus pelagicus* Anglor.," Bruch, J. f. Orn. 1853, p. 100 (India and Oceania); id. op. cit. 1855, p. 280; Bp. Consp. Av. ii. p. 214 (1857).

Dominicanus vetula, Bruch, J. f. Orn. 1853, p. 100, 1855, p. 281 (Cape Good Hope); Bp. Consp. Av. ii. 214 (1857).

"*Dominicanus vociferus* Anglor.," Bruch, J. f. Orn. 1853, p. 100, 1855, p. 281 (South America).

Dominicanus antipodum, Bruch, J. f. Orn. 1855, p. 281; Bp. Consp. Av. ii. p. 214 (1857).

Dominicanus fritzzei, Bruch, J. f. Orn. 1855, p. 281 (Straits of Sunda, near Java?) (type in Wiesbaden Mus. examined, H. S.); Bp. Consp. Av. ii. p. 214 (1857).

Larus vociferus, Burm. Syst. Uebers. Th. Bras. p. 448 (1856); id. La Plata-Reise, ii. p. 518 (1861).

Clupeilurus antipodum, Bp. Compt. Rend. xlii. p. 770 (1856).

Larus verreauxii, Bp. Rev. et Mag. Zool. vii. 1855, p. 16.

Dominicanus verreauxii, Bp.; Bruch, J. f. Orn. 1855, p. 281 (Chili).

Dominicanus azaræ (Less.), Bp. Consp. Av. ii. p. 214 (1857).

Lestris antarcticus (!), Ellman, Zool. 1861, p. 7472.

Lestris fuscus, id. Zool. 1861, p. 7472.

Larus vetula, Gurney, Andersson's B. Damara Land, p. 357 (1872); Shelley, Ibis, 1875, p. 86 (Natal).

Hab. New Zealand, Kerguelen Island, and the other islands between it and Cape of Good Hope, African coast to 22° S. lat., the opposite coast of South America, the Falkland Islands, Patagonia, the coast of Chili, and the island of Juan Fernandez. I am sceptical as to the locality assigned to *L. fritzei*, whilst equally unable to accept Bonaparte's version of Sunda being a mistake for Sund [Lund?] in Sweden!

In a large series of specimens from the above localities I can detect no specific differences, individuals from the same localities often varying quite as much in the dimensions of the bill as do those from widely remote places. The absence or presence of the white mirror near the tip of the first primary is of no specific value whatever, being entirely dependent upon the age of the individual; it does not appear till after the bird has assumed the full black mantle, and increases in size with age.

The deep brown-black of the mantle, as distinct from the slate-black of *L. fuscus*, and its strong bill and larger size, will distinguish *L. dominicanus* from that species; it is smaller than *L. marinus*, has a different pattern of primaries, and has *olivaceous-coloured* legs and feet.

Messrs. Scclater and Salvin state (P. Z. S. 1871, p. 576) that the examples then living in the Society's gardens had *flesh-coloured* legs and feet; but this is either a slip of the pen, or else they must have been looking at a *L. marinus*, the only "Black-back" which when adult has those parts of that colour.

19. LARUS PACIFICUS, Latham.

Larus pacificus, Latham, Suppl. Ind. Orn. p. 68 (1801); Gould, B. of Austral. vol. vii. pl. 19; Schlegel, M. P.-Bas, *Lari*, p. 7 (1863).

Larus frontalis, Vieillot, in Nouv. Dict. H. Nat. 2nd ed. t. xxi. p. 505 (1818), im. ad. (Tasmania).

Larus leucomelas, Vieillot, N. Dict. II. Nat. 2nd ed. t. xxi. p. 509 (1818), adult (Tasmania).

Larus bathyrinchus (sic), Macgill. Mem. Wern. Soc. v. (1823-4), p. 253.

Larus georgii, King, Surv. Intertrop. Australia, ii. p. 423 (1826) (King George's Sound, S.W. Australia).

Gabianus pacificus (Lath.), Bruch, J. f. Orn. 1853, p. 100, et 1855, p. 280; Bonap. J. f. Orn. 1854, p. 211; Rev. et Mag. Zool. 1855, p. 13; Consp. Av. ii. p. 212 (1857).

Gabianus bathyrhynchus, Bruch, J. f. Orn. 1855, p. 280; Bp. Consp. Av. ii. p. 212 (1857).

Gabianus georgii (King), Bp. Consp. Av. ii. p. 213 (1857).

Hab. South-west portions of Australia, Bass's Straits, and Tasmania; not included by Mr. Buller in his 'Birds of New Zealand,' but there are three specimens labelled from that locality in the British Museum, obtained by the Antarctic Expedition.

Mr. Gould's plate hardly gives a correct idea of the dimensions and great depth of bill in this fine species, which may easily be distinguished by this feature in all stages. In the adult the tail is crossed by a black band; and this peculiarity in the plumage, coupled with the stout bill, seems to place this species midway between the typical Gulls and those of the next group. The value of *Gabianus* as a genus for this species has been already discussed.

20. LARUS BELCHERI, Vigors.

Larus belcheri, Vigors, Zool. Journ. iv. p. 358 (1829); id. Zool. Beecher's Voy. "Blossom," p. 39; Schlegel, M. P.-Bas, *Lari*, p. 9 (1863), excl. syns.; Sci. & Salv. P. Z. S. 1871, p. 575.

Adelarus belcheri, Bruch, J. f. Orn. 1853, p. 107; id. 1855, p. 279; Bp. Naum. p. 212 (1854).

Leucophæus belcheri, Bp. Consp. Av. ii. p. 232 (1857).

"*Larus fuliginosus*, Gould," Cassin, U.S. Expl. Exp. Orn. p. 378 (1858), nec Gould (Cape Horn to Callao).

Larus frobeeenii, Phil. & Land. Wieg. Archiv, 1861, p. 292.

Larus frobeni, iid. Cat. Aves Chil. An. Univ. Chil. tom. xxxi. p. 288.

Hab. West coast of S. America, from Callao southwards to Chili, the western portions of the Straits of Magellan, and down to Cape Horn.

I have the fully adult bird with pure white head and underparts from Chorillos, near Callao, Peru; but I observed the immature birds with dark hoods in far greater numbers. Although several of these Pacific Gulls have a hood in the immature stage, which is lost in the adult, in none of them is the change so remarkable as in this species. I confess that I cannot see any adequate reason for giving it generic rank; but Bonaparte thought differently, for he made it the type of his genus *Procellarus*, being quite unaware that it was absolutely the same *species* as the bird which he had already located in the genera *Leucophæus* and *Adelarus*!

Dr. Coues, in a general notice of American Gulls, under the head of *L. heermanni* (B. of N.W. p. 642), says that *L. belcheri* is "not a white-headed Gull at all," though he afterwards says that he should not be surprised if, in the adult state, it lost its hood. In this last surmise he is quite right; the adult *L. belcheri* is a perfectly white-headed Gull, at the first glance being like a stout *L. fuscus* with a black band on its tail.

21. LARUS HEERMANNI, Cassin.

Larus heermanni, Cassin, Proc. Ac. Nat. Sc. Philad. vi. p. 187

(1852); id. B. Californ. p. 28, pl. 5; Scl. & Salv. P. Z. S. 1871, p. 574; iid. Nomencl. Av. Neotrop. p. 148.

Adelarus heermanni, Bruch, J. f. Orn. 1853, p. 107, et 1855, p. 279.

Leucophæus heermanni, Bp. Naumannia, 1854, p. 211.

Blasipus heermanni, Bp. Consp. Av. ii. p. 211 (1857).

Larus (Blasipus) heermanni, Coues, B. N.W. Am. p. 641 (1874).

Hab. Pacific coast, from Vancouver's Island and California (breeding), down to Panama in winter.

The nearest ally of this species is perhaps *L. crassirostris* of the opposite Asiatic coast and islands; but its red bill and the lead-coloured neck and underparts will always serve to distinguish the adult; in *L. crassirostris* the neck and underparts are white.

22. LARUS CRASSIROSTRIS, Vieill.

Larus crassirostris, Vieill. N. Dict. H. Nat. 2nd ed. p. 508 (1819), ex Krusenstern (Nagasaki, Japan); Schlegel, M. P.-Bas, *Lari*, p. 8 (1863); Swinh. P. Z. S. 1871, p. 421; David & Oust. Ois. de la Chine, p. 518 (1877).

Larus melanurus, Temm. Pl. Col. 77^{me} liv. pl. 459 (1828); Temm. & Schl. Faun. Japon. Aves, p. 132, pl. 88 (1850); Taczan. Bull. Soc. Zool. France, i. p. 264 (1876).

Adelarus melanurus, Bruch, J. f. Orn. 1853, p. 107, et 1855, p. 279.

Blasipus crassirostris, Bp. Naumannia, 1854, p. 211; id. Consp. Av. ii. p. 212 (1857).

Larus fuscus, Swinhoe, Ibis, 1860, p. 68 (nec Linn.).

Hab. Coasts of Japan and China, and large lakes and rivers of latter; breeding in colonies, generally on islands.

I have already pointed out roughly the distinctions between this species and *L. heermanni*; superficially the present bird is not unlike the adult of *L. belcheri*; but the mantle is much lighter, and the tail is white with a black bar, whereas in *L. belcheri* the greater portion of the tail is black.

23. LARUS MODESTUS, Tsch.

Larus modestus, Tschudi, Wieg. Arch. 1843, pt. i. p. 389; id. Fauna Peruana, Aves, p. 306 (1845-6), pl. 35; Scl. & Salv. P. Z. S. 1871, p. 573; id. Nomencl. Av. Neotrop. p. 148 (1873).

Larus bridgesi, Fraser, P. Z. S. 1845, p. 16; id. Zool. Typ. t. 69 (1849), type in Brit. Mus.

Blasipus bridgesi (Fraser), Bruch, J. f. Orn. 1853, p. 108, et 1855, p. 280; Bp. Rev. Zool. 1855, p. 21; Consp. Av. ii. p. 212.

"*Blasipus polios* (Natt.)," Bp. Rev. Zool. 1855, p. 21; Consp. Av. ii. p. 212 (1857).

Leucophaius modestus, G. R. Gray, Hand-l. Birds, iii. p. 116 (1871).

Hab. Pacific coast of South America, from Callao to Valparaiso, and probably further south.

This species, which in its immature plumage bears an indication

of a dusky hood, has been confused with *L. fuliginosus* of the Galapagos Islands; but its much slenderer bill, tarsi, and feet will at once distinguish it from the latter, even in youth; whilst in the adult the clear grey of the underparts and the white blending into grey of the forehead and head, distinguish it from any other known species of Gull. Mr. Fraser's plate above cited gives a very fair idea of the adult; but *very old* birds are much lighter about the upper parts than his example.

24. *LARUS FULIGINOSUS*, Gould.

Larus fuliginosus, Gould, Zool. "Beagle," iii. p. 141 (1841); *Sci. & Salv. P. Z. S.* 1871, p. 573; *Salvin, Trans. Zool. S.* ix. p. 505, pl. lxxxvii.

Leucophæus fuliginosus et *Adelarus neptunus*, Bp. *Rev. Zool.* 1855, p. 20; et *Consp. Av.* ii. p. 232 (1857).

Procellarus heermanni! (part.), G. R. Gray, *Hand-l. Birds*, iii. p. 116 (1871).

Hab. Galapagos Islands.

This stoutly built and well-marked species appears to be restricted to the Galapagos group. Mr. Salvin's illustration above cited will probably prevent further confusion between this bird and *L. modestus*; but it is most extraordinary that the late Mr. G. R. Gray should have confounded it with *L. heermanni*, when he had the type of the present species before him. Specimens are exceedingly rare in collections; and of the eggs and nestlings no examples are known.

Although this species differs from the preceding ones in having a hood in its adult plumage, yet its other affinities seem to indicate that its proper place is here and not with the ordinary hooded Gulls.

25. *LARUS SCORESBII*, Trail.

Larus scoresbii, Trail, *Mem. Wern. Soc.* iv. p. 514 (1823), (New South Shetland Islands); *Pelzeln, Orn. Novara Exp.* p. 151; *Abbott, Ibis*, 1861, p. 165 (Falkland Islands).

Larus hæmatorhynchus, Vigors, in *lett. King's Zool. Journ.* iv. p. 103 (1828-9); *Jard. & Selby, Ill. Orn.* ii. pl. 106; *Gould, Zool. "Beagle," Birds*, p. 142.

Leucophæus hæmatorhynchus, Bruch, *J. f. Orn.* 1853, p. 108, et 1855, p. 287; *Bp. Naum.* 1854, p. 211.

Procellarus neglectus, sive *Epitelarus neglectus*, Bp. *Naumann.* 1854, pp. 211, 213; *id. Rev. et Mag. Zool.* p. 13 (1855); *id. Consp. Av.* ii. p. 211 (1857), type and sole representative of *Procellarus*.

Leucophæus scoresbii, Bp. *Consp. Av.* ii. p. 231 (1857); *Blasius, J. f. Orn.* 1865, p. 378; *Sci. & Salv. P. Z. S.* 1871, p. 579; *iid. Nomencl. Av. Neotrop.* p. 148.

Larus scoresbyi, Schl. M. P.-Bas, *Lari*, p. 33 (1863).

Hab. Patagonia, east coast, south of about 45° S. lat., down to New South Shetland Islands, in about 63° S.; the Falkland Islands, the Straits of Magellan, and up the coast of Chili as far as Chiloe.

In spite of the somewhat peculiar shape of the bill in this species I hardly think it desirable to place it on that account in a distinct genus, especially as Bonaparte's genus *Leucophæus* also includes such dissimilar species as the present and *L. heermanni* of North America. His *Procellarus* is founded on a young bird of the same species! *Larus scoresbii*, however, is a very well-marked species, from its short, stout, crimson bill, and coarse legs and feet, the webs of the latter being a good deal incised. In the immature stage this bird has a sooty hood; but in the adult the upper parts are grey.

26. *LARUS NOVÆ-HOLLANDIÆ*, Steph. (Fig. 1.)

Larus novæ-hollandiæ, Stephens, Shaw's Gen. Zool. xiii. pt. i. p. 196 (1826), ex Latham.

Larus scopulinus, var. *major*, Forst. Descr. Anim. p. 106 (1844).

Fig. 1.



1.

2.

3.

Three outer primaries of *L. novæ-hollandiæ*, jr. (from the type of *Gavia pomaræ*, Bruch, of 1853, not of 1855).

Larus jamesonii, Wilson, Ill. Zool. pl. xxiii. (1831).

Xema jamesonii, Gould, Birds of Australia, vol. vii. pl. xx (1848).

Gavia jamesonii, Wils. Bruch, J. f. Orn. 1853, p. 102; 1855, p. 285.

Gavia andersonii, Bruch, J. f. Orn. 1853, p. 102, et 1855, p. 285 (type examined, H. S.).

Gavia pomarre, Bruch, J. f. Orn. 1853, p. 103, not *Gavia pomare* of 1855, p. 285, which is *L. bulleri* (type in Mainz Mus. examined, H. S.), Society Islands.

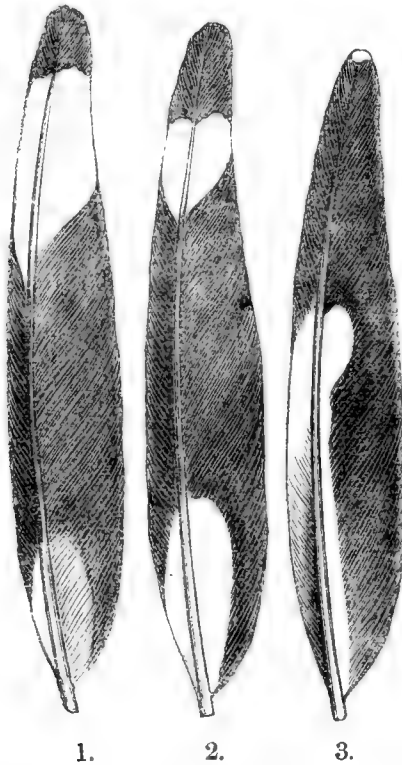
Gelastes gouldi, Bp. Naumann. 1854, p. 216.

Gelastes corallinus, Bp. Naumann. 1854, pp. 212, 216 (type in Paris M. examined, H. S.).

Gelastes andersonii, Bp. tom. cit. p. 212.

Gavia gouldii, Bp. Bruch, J. f. Orn. 1855, p. 285.

Fig. 2.



Three outer primaries of *L. novæ-hollandiæ*, ad. (from the type of *Gavia andersonii*, Bruch).

Bruchigavia gouldi, Bp. Consp. Av. ii. p. 228 (1857).

Bruchigavia pomare, Bp. tom. cit. p. 229.

Bruchigavia jamesonii, Bp. tom. cit. p. 228 (1857); Gould, Handb. B. Austral. ii. p. 387 (1865).

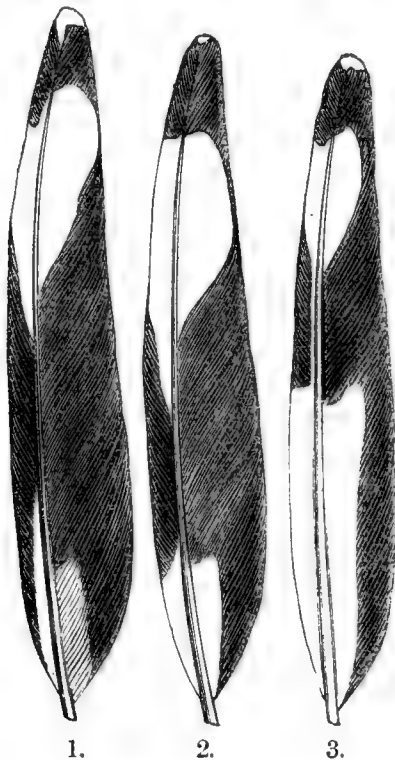
Bruchigavia corallinus, Bp. op. cit. p. 228 (1857).

Larus scopulinus major, Schlegel, M. P.-Bas, *Lari*, p. 29 (1863).

Hab. Australia from Raine Island, Torres Straits, to Bass's Straits, and Tasmania; also New Caledonia, and perhaps the Society Islands.

Although very close to *L. scopulinus* of New Zealand, I think this species may fairly be distinguished by its larger size throughout, and by the greater amount of white mirror in the pattern of the three outer primaries. In old birds of *L. novæ-hollandiæ* there is always a mirror on the *third* primary as well as on the first and second; in a large series of *L. scopulinus* I have never found this. The amount of white is also greater in the Australian bird, and the shape of the mirror is different, as is shown in the accompanying figures. *L. corallinus* of Bonaparte has been supposed to be *L. maculipennis*, Licht., on the strength of the assertion in the Conspect. Av. that the type was obtained in Brazil by Castelnau. I have examined the type, which bears no indication of locality, nor do I for a moment

Fig. 3.

Three outer primaries of *L. novæ-hollandiæ*, old.

believe that it ever was killed in Brazil; it is, however, of this species, and a large-billed example.

To make matters plainer, I have had figures prepared of the three outer primaries in three different specimens of this species. In fig. 1 (p. 185) is given the pattern in a young bird, taken from a drawing by Dr. O. Finsch of the type of *Gavia pomarre* of Bruch, 1853 (but *not* his *G. pomare* of 1855, which latter = *L. bulleri*), in the Mainz Museum. Fig. 2 (p. 186) represents the primaries of Bruch's *G. andersonii*, from the same source. Fig. 3 (p. 187)

shows the pattern of an old *L. novæ-hollandiæ*, obtained in Tasmania by Capt. V. Legge, R.A., and, if compared with fig. 4 (p. 188), will show the difference between this species and old *L. scopulinus*.

27. *LARUS SCOPULINUS*, Forst. (Fig. 4.)

Larus scopulinus, Forster, Descr. Anim. p. 106 (1844), New Zealand; Schlegel, M. P.-Bas, *Lari*, p. 28 (1863); Finsch, J. f. Orn. 1870, p. 360; Buller, B. of N. Zeal. p. 273 (1873).

Fig. 4.



Three first primaries of *L. scopulinus*, old.

Larus novæ-hollandiæ, Gray, Voy. Ereb. & Terr. Birds, p. 18 (1844), New Zealand (nec Stephens).

Lestris scopulinus, Ellman, Zoologist, 1861, p. 7472.

Hab. New Zealand.

Under the head of the preceding species I have pointed out the differences which seem to me to separate this form from *L. novæ-hollandiæ*; but the drawing (p. 188) of the first primaries of an old bird will show the principal point of distinction better than any description.

28. *LARUS HARTLAUBI* (Bruch). (Fig. 5.)

Gavia hartlaubi, Bruch, J. f. Orn. 1853, 102, et 1855, p. 268, Cape G. Hope (type examined, H. S.).

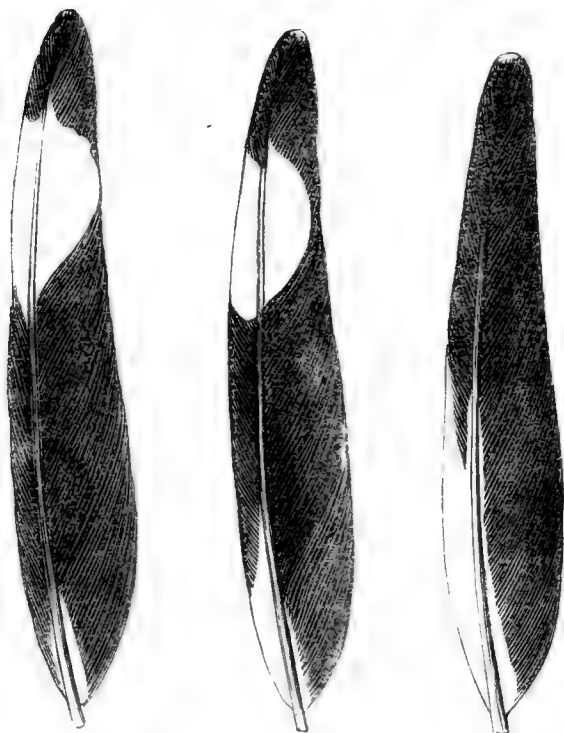
"*Larus poiocephalus*, Sw.," Layard, B. S. Africa, p. 368 (1867), nec Sw.

Larus hartlaubi, Saunders, P. Z. S. 1874, p. 293.

Hab. Southern coast of Africa, especially about Table Bay, Cape of Good Hope, where Mr. Layard obtained many specimens and also eggs, some of which he presented to me.

For a long time this species was supposed to be the winter or hoodless dress of the grey-capped *L. phæocephalus*, Sw.; but, as I have already pointed out (P. Z. S. 1874, p. 293), the present species

Fig. 5.



1. 2. 3.
Three first primaries of *L. hartlaubi*, ad.

never has a hood at all. It is quite distinct from its close allies *L. scopulinus* and *L. novæ-hollandiæ*, and may be recognized by its smaller size, proportionally longer and slenderer bill, which is of a rich crimson, and by the more sooty colour of the under wing-coverts, especially along the carpal joint. There is a small elongated mirror on the first and second primaries; but the remaining portions of those feathers are black almost to the roots. The drawing (fig. 5) shows the pattern of the primaries.

29. *LARUS BULLERI*, Hutton. (Figs. 6 & 7.)

Gavia pomare, Bruch, J. f. Orn. 1855, p. 285 (not of 1853, which = *L. novæ-hollandiæ*).

Bruchigavia melanorhynchus, Buller, Ibis 1869, p. 43 (nec *L. melanorhynchus*, Temm.).

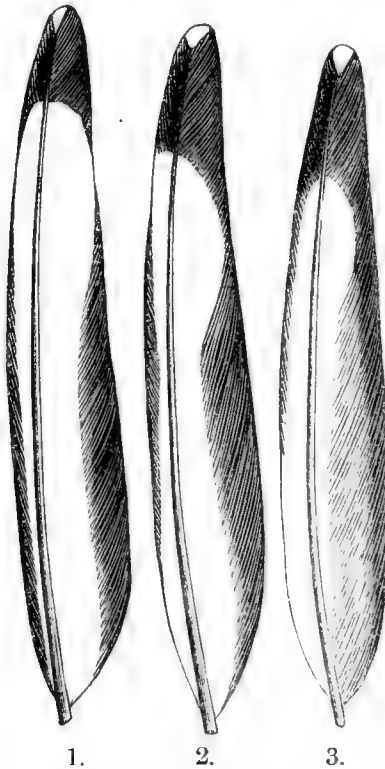
Larus (Bruchigavia) melanorhynchus, Finsch, Ibis, 1869, p. 381 ; Travers, Trans. N.Z. Inst. 1871, p. 209.

Larus bulleri, Hutton, Cat. Birds New Zeal. 1871, p. 41 ; Potts, Ibis, 1872, p. 38 ; Buller, B. New Zeal. p. 276, et fig.

Hab. This species appears to be restricted to New Zealand, and perhaps to the South Island.

I have examined the type of Bruch's *L. pomare* of 1855 ; and it is undoubtedly of this species ; but the type of his *L. pomarre* of 1853

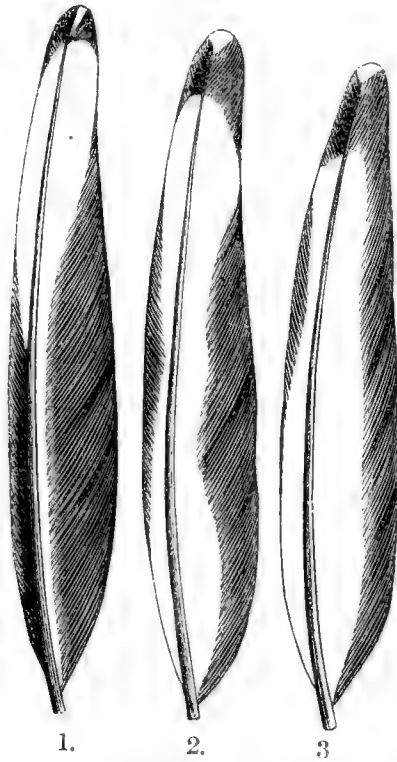
Fig. 6.

Three outer primaries of *L. bulleri*, old, from the type.

is as certainly *L. novæ-hollandiæ* ; and it is to the latter that Mr. Buller alludes as having been examined by him previous to the publication of his 'Birds of New Zealand.' The third specimen entitled *L. pomare* in the Mainz collection is a young *L. ridibundus* ! Bruch's name, therefore, cannot be employed, having been previously applied to another species ; and this species must stand as *Larus bulleri*,

Hutton. It is very distinct from *L. scopulinus*, and appears to frequent inland lakes and river-beds in preference to the sea-shore. The drawings (pp. 190, 191) showing the distinctive markings of the three outer primaries will be better than any description.

Fig. 7.



Three outer primaries of *L. bulleri*, nearly ad., from the type of *Gavia pomare*, Bruch, of 1855.

During my recent visit to Bremen I went into the question of this and the three preceding species with Dr. Finsch, who had previously studied the subject and had made numerous and careful drawings of the primaries of Bruch's types of *L. pomare* in the Mainz Museum, and of many other specimens. These drawings he most generously placed at my disposal; and, thanks to his liberality, I am enabled to figure the primaries of two of Bruch's types, bearing the same name, but belonging to two totally distinct species.

30. *LARUS GELASTES*, Licht. (Fig. 8.)

Larus gelastes, Licht. in Thienem. Fortpflanz. Vög. Eur. pt. v. p. 22 (1838), type in Berlin Mus.; Keys. & Blas. Syst. Verzeichn. Europ. Säug. p. 95 (1840); Degl. Orn. Europ. ii. p. 318 (1849); Bree, B. Eur. 2nd ed. v. p. 72 (1876); Blanford, East Persia, ii. p. 291 (Makran coast).

"*Larus leucocephalus*, Boissonneau," fide Keys. & Blas. op. cit. p. 22.

Larus genei, De Brème, Rev. Zool. ii. (1839) p. 321.

Larus tenuirostris, Temm. Man. d'Orn. 2nd ed. pt. iv. p. 478, pl. (1840); Crespon, Faune Mérid. ii. p. 126 (1844).

Xema lambruschinii, Bp. Icon. Faun. Ital. i. Ucc. p. 135, pl. (livr. xxvii. 1840).

Xema gelastes (Licht.), Boie, Isis 1844, p. 192.

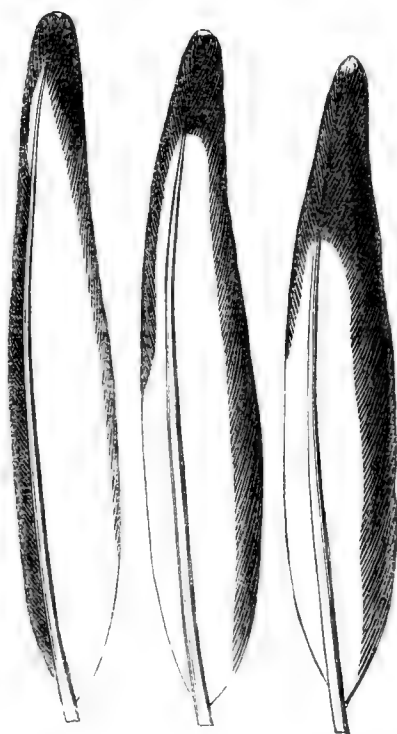
Xema genei (De Brème), id. loc. cit.

Gavia gelastes, Bruch, J. f. Orn. 1853, p. 102, et 1855, p. 286.

Larus columbinus, Golowatschow, Bull. Soc. Imp. Nat. Mosc. 1854, t. i. p. 435.

"*Gelastes rubriventris* (Vieill.)," Bp. Naum. 1854, p. 216.

Fig. 8.



1. 2. 3.

Three outer primaries of *L. gelastes*, juv.

Gelastes lambruschini, Bp. Cat. Parzud. p. 11 (1855); id. Consp. Av. ii. p. 227.

Larus subroseus et *Larus brehmii*, Heugl. Syst. U. Vög. N.O.-Afr. Sitz. Ak. Wiss. Wien, 1856, p. 321; cf. Heugl. Orn. N.O.-Afr. ii. Abth., Band 2, p. 1412.

Gelastes columbinus. Bp. Consp. Av. ii. p. 227 (1857).

"*Gelastes leucocephalus*, Brisson," Bp. Consp. Av. ii. p. 227 (syn.).

Larus lambruschini, Bp., Schl. M. P.-Bas, *Lari*, p. 28 (1863); Hume, *Stray Feath.* i. p. 274 (1873).

Chroicocephalus gelastes, Licht. *Nomencl. Av. M. Berolst.* p. 98. "*Larus arabicus*, Hemp. & Ehr.," *Mus. Berolst.* (fide H. S.).

Hab. South coast of Spain, the Mediterranean and Black Sea (breeding); the Red Sea, Persian Gulf, and the coasts as far as Kurrachi; also West Africa to Senegal, whence there is a specimen in the Paris Museum.

This species seems to have no very near allies. It never has a hood; yet its structure and wing-pattern remind us of *L. ridibundus*. In appearance it is like *L. scopulinus*; but its wings are very long, its bill is slender, its flight is Tern-like, and its eggs are singularly like those of *Sterna cantia* and *S. media*. I locate it here because I do not know of any better position for it.

31. LARUS LEUCOPHTHALMUS, Licht.

Larus leucophthalmus, Licht.; Temm. *Pl. Col.* liv. 62, pl. 366 (1825); id. *Man. d'Orn.* 4^{me} pt. p. 486 (1840); Heugl. *Ibis*, 1859, p. 349; König-Warth. *Ibis*, 1860, p. 129; Finsch & Hartl. *Vög. Ostaf.* p. 821; Finsch, *Trans. Zool. Soc.* vii. pt. vi. p. 302; Schl. M. P.-Bas, *Lari*, p. 32.

Iris (mispr.) *leucophthalmus*, Lesson, *Tr. d'Orn.* p. 618 (1831).

Xema lecopthalmum, Bp. *Ucc. Eur.* p. 78 (1842).

Xema leucophthalma, Gray, *Brit.-M. List, Anseres*, p. 171 (1844).

Adelarus leucophthalmus, Bruch, *J. f. Orn.* 1853, p. 106, et 1855, p. 278; Bp. *Compt. Rend.* xlii. p. 771 (1856); Blasius, *J. f. Orn.* 1865, p. 378.

Chroicocephalus leucophthalmus, Brehm, *Naumannia*, 1855, p. 295.

Larus masauanus, Heugl. *Peterm. Geogr. Mittheil.* 1861, p. 31.

Hab. Temminck states that this species visits Greece and the shores of the Bosphorus; but no recent travellers in those parts have ever met with it; and although two energetic naturalists, Dr. Krüper and M. Alléon, have for years been resident in the neighbourhood and have thoroughly explored the Greek Archipelago and the Bosphorus, they have never met with it, either there or in the Eubœan channel, which Lindermayer (*Vög. Griech.* p. 177) so particularly indicates. Even in the Red Sea it is, according to Von Heuglin, very scarce north of the tropic, though frequent more to the south; it does not, however, appear to go beyond the Gulf of Aden and the Somali coast; for neither Blanford nor Hume mention it as occurring along the Mekran coast; and its range is therefore much less extensive than that of the allied species *L. hemprichi*.

32. LARUS HEMPRICHI (Bp.).

Xema crassirostris (Licht.), Boie, *Isis.* 1844, p. 192.

Larus crassirostris, Licht. *Nomencl.* p. 99 (1854) (nec Vieill.), *Mus. Berolst.*

Adelarus hemprichii, Bp.; Bruch, *J. f. Orn.* 1853, p. 106 (descr.), et 1855, p. 278; Bonap. *Naum.* 1854, p. 212; Blasius, *J. f. Orn.* 1865, p. 378.

Larus hemprichi, Heugl. Ibis, 1859, p. 350 ; König-Warth. Ibis, 1860, p. 129 (nidif.) ; Schleg. Mus. P.-Bas, *Lari*, p. 32 ; Finsch, Trans. Zool. S. vii. pt. vi. p. 302, pl. xxvii. ; Finsch & Hartl. Vög. Ostaf. p. 823 ; Blanford, Abyssinia, p. 441 (Red Sea) ; Hume, Stray Feath. i. p. 279 ; Blanford, East Persia, ii. p. 292 (Aden to Kurrachee harbour) ; Hume, Stray F. 1876, p. 414 ; Butler, op. cit. 1877, p. 296.

Hab. This Gull appears to have a wider range than its congener *L. leucophthalmus*, as it is not confined to the Red Sea south of the tropic, but also frequents the Persian Gulf and the coast eastward as far as Bombay. Von Heuglin and Baron König von Warthausen (*loc. cit.*) have given an excellent account of the habits and nidification of both these species ; and more recently in 'Stray Feathers' Capt. Butler has given a description of the great colony on the island of Astola.

In the Bulletin de la Société Zoologique de France, 1^{re} partie, 1877, p. 32, M. Jules Vian gives an account of two immature specimens, one of *L. leucophthalmus* and one of *L. hemprichi*, which were supposed to have been obtained on the coast of Nice. M. Vian showed me these specimens when I was last in Paris ; and they are undoubtedly genuine examples of the respective species. M. Vian thinks that the opening of the Suez Canal may have caused their appearance upon the shores of France ; I cannot prove the contrary, but, from the make-up of the skins, I must confess I am very sceptical as to their having got so far as Nice *alive*. They had passed through at least one, if not two dealers' hands before M. Vian saw them.

33. *LARUS ATRICILLA*, Linn.

Larus atricilla, Linn. Syst. Nat. i. p. 225 (1766), nec Pallas (ex Catesby) ; Gm. Syst. Nat. i. p. 600 (1788) ; Temm. Man. d'Orn. ed. 2, pt. ii. p. 779 (Mediterranean, in error) ; Montagu, Orn. Dict. Rennie's ed. p. 259 (1833) (Winchelsea) ; Schl. M. P.-Bas, *Lari*, p. 44 (1863) ; Sc. & Salv. P. Z. S. 1871, p. 576 ; Coues, B. N.-West Am. p. 650 (1874) ; Reid, Zoologist, 1877, p. 489 (Bermudas).

Larus ridibundus, Wilson, Am. Orn. ix. p. 89, pl. 74. fig. 4 (1814), nec Linn. ; Léotaud, Ois. de Trinidad, p. 532.

Xema atricilla, Boie, Isis, 1822, p. 563 ; Cab. in Schomb. Guiana, iii. p. 761.

Gavia atricilla, Macgill. Man. Brit. Orn. ii. p. 240 (1842).

Chroicocephalus atricilla, Bruch, J. f. Orn. 1853, p. 106 ; Lawr. B. N. Am. p. 850 (1858).

Chroicocephalus serranus, Bruch, J. f. Orn. 1853, p. 106 (nec Tschudi).

Atricilla catesbyi, Bruch, J. f. Orn. 1855, p. 287.

"*Atricilla megalopterus*," Bp. ; Bruch, J. f. Orn. 1855, p. 287.

"*Atricilla micropterus*," Bp. ; Bruch, tom. cit. p. 288.

Hab. America, from Maine, on the east coast, down to the mouth of the Amazons and to the West-Indian Islands ; on the west coast,

California, Mexico, Guatemala, and as far south as Tumbez, the northern frontier of Peru (*Jelski*). Once obtained by Col. Montagu at Winchelsea, Sussex. The specimen in the British Museum, from his collection, is undoubtedly of this species; but there seems to be no warrant for its reputed occurrence in Southern Europe and the Mediterranean.

This species may always be known by its black primaries.

34. *LARUS FRANKLINI*, Sw. & Rich.

Larus atricilla, J. Sabine, App. Franklin's Polar Sea, p. 695 (1823), nec Linn. nec auctt. (the description clearly applies to this species).

Larus franklini, Sw. & Rich. F. Bor.-Am., Birds, p. 424, pl. lxxi. (1831); Schlegel, Mus. Pays-Bas, *Lari*, p. 36 (1863); ScL. & Salv. P. Z. S. 1871, p. 577; Newton, P. Z. S. 1871, p. 57, pl. iv. fig. 4, egg (Manitoba); Coues, B. N.-West Am. p. 653 (1874).

Larus cucullatus, Licht. MSS. (Mexico), type in Berlin Mus. (examined, H. S.).

Larus pipixcan, Wagler, Isis, 1831, p. 515.

Xema franklini, Bp. Comp. L. B. Eur. & N. Am. p. 62 (1838); Boie, Isis, 1844, p. 194.

Xema pipixcan, Boie, loc. s. cit.

Chroicocephalus franklini, Bruch, J. f. Orn. 1853, p. 104, et 1855, p. 289; Lawr. B. N. Am. p. 851 (1858).

Chroicocephalus cucullatus, Bruch, J. f. Orn. 1853, p. 104, et 1855, p. 290; Lawr. B. N. Am. p. 851 (1858); Coues, Proc. Phil. Ac. 1862, p. 309.

Chroicocephalus kitlitzii, Bruch, J. f. Orn. 1853, p. 104 (described from a drawing), nec Swinhoe, P. Z. S. 1860, which = *L. saundersi*.

Chroicocephalus schimperi, Bruch, J. f. Orn. 1853, p. 104 (nec Schlegel, 1863, which = *L. saundersi*).

Larus cinereo-caudatus, Ph. et Landb. Wieg. Arch. 1861, p. 293.

Hab. Interior of North America, west of the Mississippi; breeds in Manitoba; seldom visits the Atlantic coast, but has once occurred at St. Bartholomew's, West Indies (*Sund.*); goes down the Pacific coast as far as Chili, whence I have a fully adult example with partial hood, collected by Mr. E. Reid, of Santiago, and also one from Callao, Peru.

The primaries of this species undergo much alteration with the age of the bird; and in time the subapical mirror on the first extends over the greater part of the webs.

From the description there can be little or no doubt that Bruch's *L. kitlitzii* and *L. schimperi* are referable to this species. Both were suppressed in his second review (1855), when he corrected a few of his more glaring errors; and all trace of the second name has vanished from the Mainz Museum, where I especially looked for it, as Schlegel had adopted it for a totally different Chinese species. The type was said to have come from New Zealand, had a bright red bill, dark hood, and black primaries with white tips.

35. *LARUS SERRANUS*, Tsch. (Fig. 9.)

Larus serranus, Tschudi, Wieg. Arch. 1844, pt. i. p. 314; Fauna Peruana, Aves, p. 307 (1845-6); Scl. & Salv. P. Z. S. 1871, p. 577.

Chroicocephalus personatus (Natt.), Bruch, J. f. Orn. 1853, p. 104, et 1855, p. 289.

Xema cirrhocephalum, Peale; Cassin, U.S. Expl. Exp. Orn. p. 381 (1858).

Larus glaucotis, Cassin, l. c. p. 381 (1858).

Gavia serrana, Bp. Rev. Zool. 1855, p. 19.

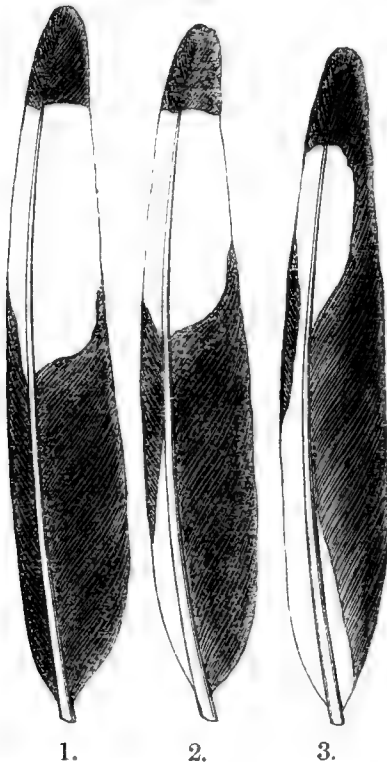
Larus personatus, Natt.; Schl. M. Pays-Bas, *Lari*, p. 35 (1863).

Gavia personata, Blasius, J. f. Orn. 1865, p. 372.

Larus bonapartii, Scl. & Salv. P. Z. S. 1868, p. 178.

Hab. This fine black-hooded species is found throughout the Cordillera and the Andes of Northern Chili, Bolivia, Peru, and as far north as Ecuador, whence Mr. Salvin has a specimen. It breeds

Fig. 9.

Three outer primaries of *L. serranus*, ad.

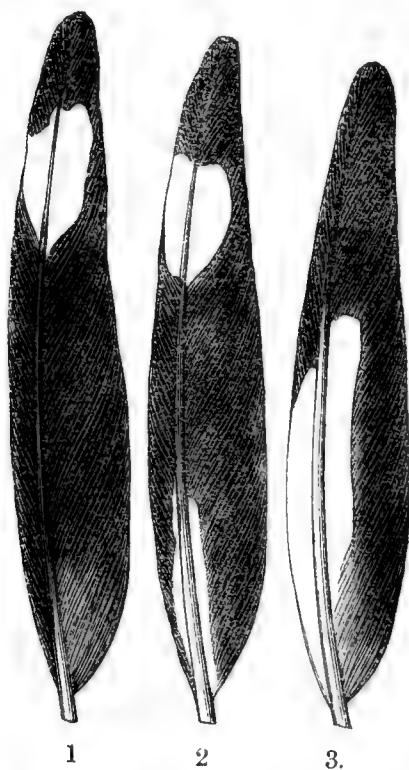
in colonies on the shores of mountain-lakes, and is well known to the Quichua-speaking Indians under the name of "Quiulla," doubtless an imitation of its cry. During the bad weather it descends to the west coast. The eggs and nestlings are as yet unknown to me.

Messrs. Sclater and Salvin (P. Z. S. 1871, p. 577) quote Burmeister as an authority for the occurrence of this species near Mendoza in the Argentine Republic; but the description which he gives clearly applies to *L. maculipennis*; indeed the dimensions cited being *smaller* than those of *his L. maculipennis*, Licht. (which, again, is not that species, but *L. cirrhocephalus*, Vieill.), show clearly that his bird cannot possibly be the real *L. serranus*, which is the largest of the group of the true Hooded Gulls in America. On the other hand, the dimensions assigned by Peale and Cassin to their respective *X. cirrhocephalum* and *L. glaucotis* (18 inches long), and the descriptions of the markings of the primaries, go to prove that those names must be referred to this species. The figure (p. 196) shows the pattern of the primaries in an adult and tolerably old bird.

36. *LARUS BRUNNEICEPHALUS*, Jerdon. (Fig. 10.)

Larus brunneicephalus, Jerdon, Madras Journ. xii. p. 225 (1840); Schl. Mus. P.-Bas, *Lari*, p. 35 (1863).

Fig. 10.



Three outer primaries of *L. brunneicephalus*, ad.

Xema brunneicephala, Gray, List of B. in Brit. Mus. iii. p. 172 (1844); Jerdon, B. of India, iii. p. 832 (1864); Holdsworth, P. Z. S. 1872, p. 480 (Ceylon).

Chroicocephalus brunnicephalus, Bruch, J. f. Orn. 1853, p. 105.

Chroicocephalus brunniceps, Cabanis, J. f. Orn. 1853, p. 105 (note); Bruch, J. f. Orn. 1855, p. 291.

Chroicocephalus brunneicephalus, Bp. Compt. Rend. Ac. Sc. xli. p. 73 (1856); Swinhoe, P. Z. S. 1871, p. 421; Dav. et Oust. O. de la Chine, p. 521.

Xema brunneicephalum, A. David, N. Arch. Mus., Bull. vii. no. 460 (1871).

Larus lacrymosus, Licht. (Bengal, imm.), type in Berlin Mus. (examined, H. S.).

Gavina lacrymosus (Licht.); Bp. Naum. 1854, p. 212.

Gavia brunnicephalus (Jard.); Bp. Naum. 1854, p. 213.

Chroicocephalus tibetanus, Gould, P. Z. S. 1864, p. 54. [Tibet, Major Hay.]

Xema brunneicephala, Hume, Yarkand Exp. Orn. p. 300, pl. xxxii. (1873); Blyth, J. A. S. B. 1875, pt. ii. p. 162 (Burma).

Hab. Henderson found this Gull very abundant in full breeding-plumage in July, at an elevation of 15,000 feet, near the Pangong lake; and in winter it occurs both on the inland waters and along the coast of India, as far west as Sind. Eastward it occurs in Burma and visits Ceylon, where it is abundant. David obtained it abundantly in Mongolia and China, apparently as near to the sea-board as Pekin. Taczanowski, however, does not cite it amongst the species found in any part of Siberia; and it is therefore doubtful if it can be Middendorff's *L. ridibundus*, var. *major*. As regards its reported occurrence in Japan, Cassin's bird obtained in Parry's expedition is clearly *L. ridibundus*.

37. *LARUS ICHTHYAËTUS*, Pall.

Larus ichthyaëtus, Pallas, It. ii. App. no. 27 (1776), Caspian; Gm. Syst. Nat. i. p. 599 (1788); Pallas, Zoogr. Ros.-As. ii. p. 322 (1811); Rüpp. Reise N. Afr. Atlas, p. 27, pl. 17 (1826), Red Sea; Cassin, Perry's Exp. Japan, ii. p. 232 (1856) (?); Tristram, Ibis, 1868, p. 330, Palestine; Shelley, B. of Egypt, p. 307, pl. 13 (1872); Schlegel, M. P.-Bas, *Lari*, p. 34 (1863); Dresser, B. of Europe, pt. xviii. (June 1873).

Ichthyaëtus, Kaup, Natürl. Syst. pp. 102, 169 (1829), type of genus *Ichthyaëtus*.

Xema ichthyaetum, Bp. B. Eur. & N. Am. p. 62 (1838).

Larus kroicocephalus, Jameson, Journ. As. Soc. viii. p. 242 (1839).

Kroikocephalus ichthyaëtus, Jerdon, B. of India, iii. p. 831 (1864).

Chroicocephalus ichthyaëtus, Bruch, J. f. Orn. 1853, p. 104; Swinhoe, P. Z. S. 1863, p. 327.

Larus ichthyaëtus minor, Schl. M. P.-Bas, *Lari*, p. 34 (1863).

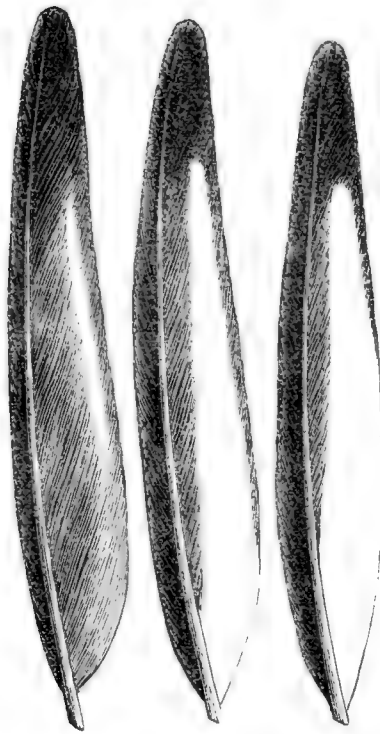
Hab. Caspian Sea and inland lakes, Lake of Galilee (*Tristram*), Mediterranean coast of Egypt and up to Nubia, the Red Sea, thence to Bombay and down the coast to Madras, and on the lakes and large rivers of Northern India. As a straggler, in the Black Sea and the Greek Archipelago, and once at the mouth of the Exe, in Eng-

land Cassin states that Perry's expedition obtained two specimens in Yedo Bay, Japan, where it is described as abundant; but both the supposed examples were young birds without a trace of a hood, only striated on the head; and the other points of the description would equally apply to young Herring-Gulls, which I am inclined to think they were. At all events the reported occurrence of this Gull in Japanese waters remains unconfirmed; Capt. Blakiston has never met with it; and Capt. St. John, H.M.S. 'Sylvia,' during the years he was surveying those coasts, never saw it.

38. *LARUS MELANOCEPHALUS*, Natt. (Fig. 11.)

Larus melanocephalus, Natt. Isis, 1818, p. 816; id. in Temm. Man. d'Orn. 2nd ed. ii. p. 777 (1820); Schl. M. P.-Bas, *Lari*,

Fig. 11.



1. 2. 3.

Three outer primaries of *L. melanocephalus*, jr.

p. 43 (1863); Degl. & Gerbe, Orn. Europ. ii. p. 437 (1867); Bree, B. of E. 2nd ed. v. p. 81 (breeding in Black Sea); Saund. Ibis, 1872, p. 79 (Thames).

Xema melanocephalus, Boie, Isis, 1822, p. 365.

Xema melanocephalon, Brehm, Vög. Deutschl. p. 757 (1831).

Xema caniceps, Brehm, Vög. Deutschl. p. 758.

Chroicocephalus melanocephalus, Bruch, J. f. Orn. 1853, p. 104.

Melagavia melanocephalus, Bp. Naum. 1854, p. 213.

Gavia melanocephala, Bp. Compt. Rend. 1856, xlii. p. 771.

Hab. Mediterranean and Black Sea ; outside the Straits of Gibraltar I observed it, apparently breeding, in the marshes of Huelva ; and it regularly ascends the west coast of the Iberian peninsula and of France as far as Bordeaux, as is proved by the specimens annually obtained there. It is therefore not at all astonishing that an immature specimen should have been shot out of a flock of *L. ridibundus* at Barking Creek in January 1866. This example is in the British Museum.

In old birds the primaries are white, excepting a very black streak down the outer web of the first primary only ; but it is not unusual to find birds with the full black hood and white tail indicative of maturity, but with a good deal of black on both the outer and inner webs of the outer five primaries, the black crossing both webs near their extremities and forming a subapical bar. The drawings (fig. 11, p. 199, and fig. 12, p. 201) show the differences between the pattern of the three outer primaries of a bird of the year, shot in March, and that of a *L. ridibundus* of about the same age.

39. *LARUS RIDIBUNDUS*, Linn. (Fig. 12.)

? *Larus cinerarius*, Linn. Syst. Nat. i. p. 224 (1766).

Larus ridibundus, Linn. Syst. Nat. i. p. 225 (1766) ; Schl. M. P.-Bas, *Lari*, p. 37 (1863).

Larus erythropus, Gm. Syst. Nat. i. p. 597 (1788).

Larus cinerarius, Schöff. Mus. Orn. p. 63 (1789) ; Pall. Z. Rosso-As. ii. p. 326.

Larus canescens, Bechst. Orn. Tash. p. 370 (1802).

Larus atricilla, Pallas, Zoogr. Rosso-As. ii. p. 324 (1811), nec Linn.

Larus nævius, id. tom. cit. p. 327.

Larus capistratus, Temm. Man. d'Orn. 2nd ed. pt. ii. p. 785 (1820).

Xema ridibundus, Boie, Isis, 1822, p. 563.

Xema capistratus, Boie, Isis, 1822, p. 563, et 1844, p. 192.

Xema ridibundum, Brehm, Vög. Deutsch. p. 760 (1831).

Xema pileatum, id. op. cit. p. 761.

Xema capistratum, id. op. cit. p. 762.

Chroicocephalus capistratus, Eyton, Hist. Rarer Brit. B. p. 63 (1836) ; Bruch, J. f. Orn. 1853, p. 105.

Chroicocephalus ridibundus, Eyton, Cat. Brit. Birds, p. 53 (1836) ; Bruch, J. f. Orn. 1853, p. 105 ; Swinhoe, P. Z. S. 1871, p. 421 ; David & Oust. Ois. de la Chine, p. 520 (1877).

Gavia ridibundus, Bp. Naumannia, 1854, p. 213.

Gavia capistratus, Bp. op. cit. p. 213.

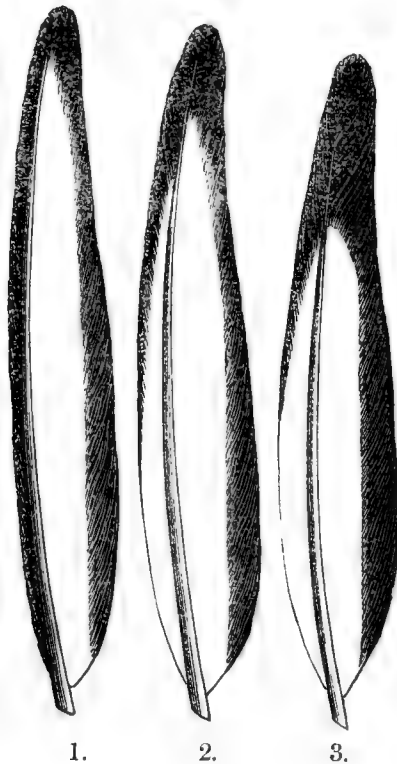
Chroicocephalus pileatus, Brehm, Naum. 1855, p. 295.

Larus brunneicephalus?, Cassin, Perry's Exp. Japan, ii. p. 233 (1856), clearly this species in winter dress.

Larus cahirinus, "Hemp. & E., Syria," Mus. Berolst (*fide* H. S.).
Larus cahiricus, "Ehr. Arabia," id. (*fide* H. S.).

Hab. Northern and temperate Europe, breeding; the Mediterranean coast to Egypt and Asia Minor, the Red Sea, Arabian coast, and the coast, interior waters, and rivers of India; ascending for 500 miles up the Burrampootra (*Godwin-Austen*), Burma, China, and

Fig. 12.



Three outer primaries of *L. ridibundus*, jr.

Japan in winter; also throughout the more temperate portions of Siberia (breeding). It is said by Schlegel to visit "South Africa;" but I remain rather suspicious of the accuracy of the collectors who are responsible for that somewhat vague locality, so long as this statement is unconfirmed from other sources.

40. *LARUS MACULIPENNIS*, Licht. (Fig. 13.)

Larus maculipennis, Licht. Verz. Doubl. p. 83 (1823), Monte Video (type examined, H. S.); Scl. & Salv. Nom. Av. Neotrop. p. 148 (1873); Durnford, Ibis, 1877, p. 43 (Chuput valley, Patagonia); id. tom. cit. p. 202 (prov. B. Ayres).

Xema cirrhocephalum, Gould, Zool. Beagle, iii. p. 142 (1841), partim.

Xema cirrhocephala?, Gray, List Birds Brit. Mus. iii. p. 173 (1844), partim (East Patagonia).

Chroicocephalus maculipennis, Bruch, J. f. Orn. 1853, p. 105.

Gavia maculipennis, Blasius, J. f. Orn. 1865, p. 374.

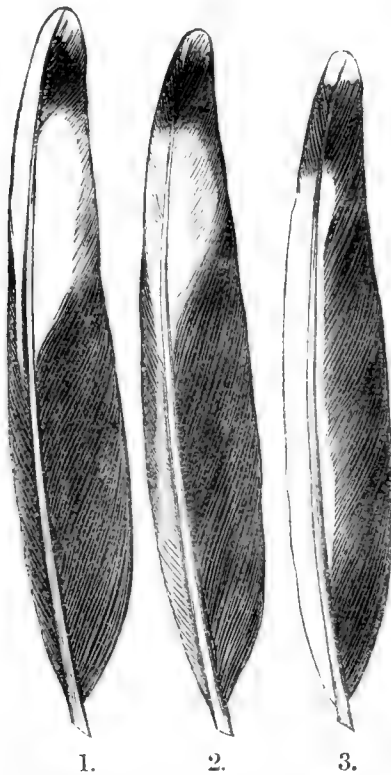
"*Larus serranus*, Tsch.," Burmeister, La Plata-Reise, ii. p. 519 (1861), nec Tschudi (Entre Rios, Mendoza).

Larus cirrhocephalus, Hudson, P. Z. S. 1870, p. 802; id. P. Z. S. 1871, p. 4, nec Vieillot.

Larus glaucodes, Saunders, P. Z. S. 1874, p. 294 (partim).

Hab. Chuput valley, North-east Patagonia (breeding), up to the La Plata, the Argentine Provinces, Mendoza, Entre Rios, Uruguay, and the south coast of Brazil.

Fig. 13.



Three outer primaries of *L. maculipennis*, old.

Burmeister's description of the bird which he calls *L. serranus* clearly applies to this species; the dimensions (length 12 in., wing 11 in., tarsus 2 in.) exactly suit it, whilst the wing of true *L. serranus* is over 14 in. long.

The distinction between this species and the next, *L. glaucodes*, seems to rest upon the patterns of the primaries, as shown in the drawings (figs. 13 and 14). In *L. maculipennis* the black forms a bar; in *L. glaucodes* it is a mere border: and this is perfectly constant.

I have selected the primary of the *oldest L. maculipennis* I could find as presenting the least amount of black, and therefore closest to *L. glaucodes*; but, in spite of that, the difference is quite recognizable.

41. *LARUS GLAUCODES*, Meyen. (Fig. 14.)

Larus glaucodes, Meyen, Obs. Zool. p. 115, pl. xxiv.; id. Beitr. Zool. p. 239, pl. xxxiv. (1834); Gay, Faun. Chil. Aves, i. p. 480 (1847); Cassin, Birds U.S. Astronom. Exp. p. 204 (1855); Sci. & Salv. Nom. Av. Neotrop. p. 148 (1873).

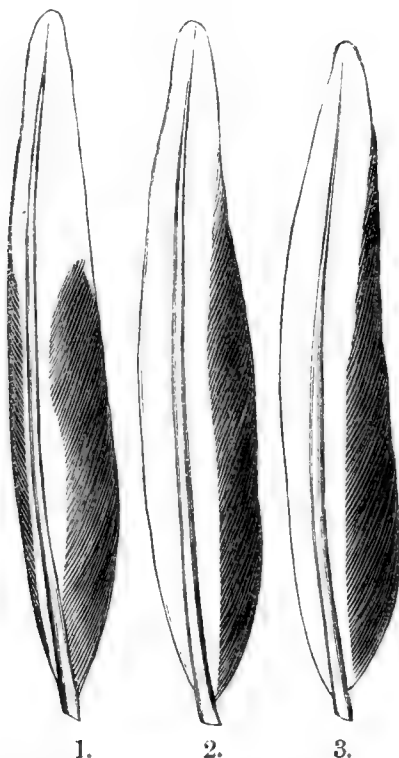
Larus glaucotes, Cabanis, Ibis, 1861, p. 312.

Larus glaucotis, Schlegel, Mus. P.-B. *Lari*, p. 42 (1863).

Xema cirrhocephalum, Gould, Zool. Beagle, iii. p. 142 (1841), part., nec Vieill.

Xema cirrocephala, Gray, List Birds Brit. Mus. iii. p. 173 (1844).

Fig. 14.



Three outer primaries of *L. glaucodes*, old.

Xema glaucodes, Boie, Isis, 1844, p. 192 ?

Larus albipennis, Peale, Zool. U.S. Expl. Exp. p. 288 (1848); *fide* Cassin, in Orn. U.S. Expl. Exp. p. 379 (1858); Chili.

Larus albipennis, Licht. M.S.; Gray, List B. Brit. M. p. 173 (1844), type in Berlin Mus. (examined, H. S.).

Chroicocephalus glaucotes, Bruch, J. f. Orn. 1853, p. 105, et 1855 p. 291.

Gavia roseiventris, Gould, P. Z. S. 1859, p. 97 (Falkland Islands).

Larus roseiventris, Selater, P. Z. S. 1860, p. 391; Abbott, Ibis, 1861, p. 166 (Falkland Islands).

Gavia glaucotis, Blasius, J. f. Orn. 1865, p. 374.

Chroicocephalus glaucodes, G. R. Gray, Hand-l. Birds, iii. p. 114.

Hab. Falkland Islands, Straits of Magellan, Western Patagonia, and coast of Chili. I cannot find any evidence of its occurrence in Eastern Patagonia; and certainly at the Chuput river, lat. 43° S., its place is taken by *L. maculipennis*.

Specimens from the Falklands seem to be smaller on the average than Chilian examples; but there is no other point of difference.

42. *LARUS CIRRHOCEPHALUS*, Vieill.

Larus cirrhocephalus, Vieillot, in 2nd ed. Nouv. Dict. Hist. Nat. t. xxi. p. 502 (1818), Brazil; id. Gal. des Ois. ii. p. 223, pl. 289 (1834); Schlegel, M. P.-Bas, *Lari*, p. 37 (1863); ScL. & Salv. P. Z. S. 1871, p. 578; iid. Nom. Av. Neotrop. p. 148 (1873); Saunders, P. Z. S. 1874, p. 292; Durnford, Ibis, 1877, p. 201.

Larus poliocephalus, Temm. M. d'Orn. ii. p. 780 (1820); Max. v. Wied, Beitr. iv. p. 854; vide Salv. Ibis 1874, p. 320.

Chroicocephalus cirrhocephalus, Bruch, J. f. Orn. 1853, p. 106.

Cirrhocephalus plumbeiceps, Bruch, J. f. Orn. 1855, p. 288.

"*Larus maculipennis*, Licht.," Burm. Syst. Ueb. Th. Brasil. iii. p. 448 (1856), nec Licht. (Brazil coast, especially the small islands); id. La Plata-Reise, ii. p. 518. no. 256 (1861) (R. Paraná).

Gavia cirrhocephala (part.), Blasius, J. f. Orn. 1865, p. 376.

Hab. Coast of Brazil, bays and lakes, down to Rio de la Plata, and up the Paraná. Mr. Durnford did not observe it south of Buenos Ayres. On the Pacific coast it occurs near Callao, one specimen from Chorillos being in my own collection, and another, obtained by M. Grec of Lima at the Chinchas Islands in 1855, being in the Bordeaux Museum.

43. *LARUS PHÆOCEPHALUS*, Sw.

Larus poiocephalus (sic), Swains. B. W. Afr. ii. p. 245, pl. 29 (1837): ad. ex. believed to be the type, in Cambr. Mus. from Senegambia, examined, H. S.

Xema phæocephala, Strickl. & ScL. B. of Damar., Contrib. Orn. 1852, p. 160.

Gavia cirrhocephala (part.), Blasius, J. f. Orn. 1865, p. 376.

Larus poiocephalus, Swains., Layard, B. S. Afr. p. 368 (1867), partim; Barboza du Bocage, J. f. Orn. 1876, p. 293 (Cunene, Benguela).

Larus phæocephalus, Hartl. Orn. W.-Afr. p. 252 (1857); id. J. f. Orn. 1861, p. 273; Finsch & Hartl. Vög. Ost-Afr. p. 825 (1870); Saunders, P. Z. S. 1874, p. 292.

Cirrhocephalus poiocephalus, Gurney, Anderss. B. Damaral. p. 358 (1872).

Hab. West Coast of Africa from the Gambia down to Walvisch

Bay, Damaraland, and at Lake Ngami (*Chapman*). I possess or have examined specimens from the above localities. The species may extend as far as the Cape of Good Hope and to the south-east coast; but of this I have no positive information.

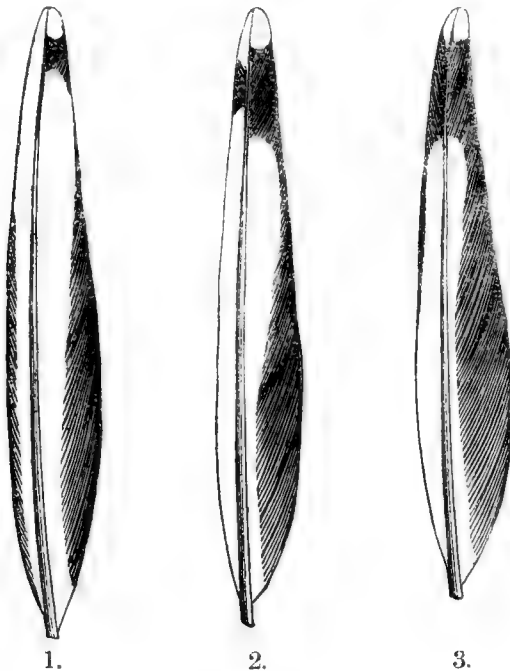
This species is very closely allied to *L. cirrhocephalus*; but it is smaller, and the bill and feet are orange-red, whilst in the larger American species those soft parts are of a deep lake-colour; and the feathers in this species do not come down so close to the base of the nostrils—differences which are quite sufficient to separate the two forms. The African species was long confounded with *L. hartlaubi* of the Cape of Good Hope, a bird belonging to a totally distinct group, and which never has a hood at all.

44. *LARUS SAUNDERSI* (Swinhoe). (Fig. 15.)

"*Gavia kittlitzii*, Bruch," Swinhoe, *Ibis*, 1860, p. 68 (not of Bruch, which is described from a drawing and is *L. franklini*).

Larus schimperi, Schlegel, M. P.-Bas, *Lari*, p. 40, 1863 (not of Bruch, 1853, nor of Bp., which = *L. franklini*).

Fig. 15.



Three outer primaries of *L. saundersi*, ad.

Chroicocephalus kittlitzii, Swinh. *Ibis*, 1863, p. 428, et P. Z. S. p. 328.

Xema kittlitzii, David, N. Arch. Mus. Bull. vii. 1871, no. 461.

Chroicocephalus saundersi, Swinhoe, P. Z. S. 1871, pp. 273, 421, pl. 22; David & Oustalet, Ois. de la Chine, p. 523 (1877).

Hab. The coasts of China, especially about Amoy, in winter

(*Swinhoe*), and the interior waters, and those of Mongolia (*David*). Nidification unknown.

This well-defined species, with which my friend the late R. Swinhoe did me the honour to associate my name, is, to judge by the structure of its feet, an inland species or river-Gull during a great part of the year. The tarsi are slender, the hind toe elevated and long, and the webs of the feet are much scalloped; indeed the foot is almost that of a Marsh-Tern. Had Bonaparte or Bruch been acquainted with it, they would doubtless have created a genus for it. The bill is very stout and corvine-looking; the hood, in breeding-plumage, is of a deep metallic black; and the pattern of the primaries (see fig. 15, p. 205) is also peculiar, these being principally white with a black bar near the tip, and a black border to the edge of the inner web.

45. *LARUS MINUTUS*, Pallas.

Larus albus, Scop. Ann. i. Hist. Nat. p. 80. no. 106 (1769).

Larus minutus, Pallas, Reise Russ. Reichs, iii. p. 702, App. no. 35 (1776); Gm. Syst. Nat. i. p. 595 (1788); Pallas, Zoogr. Rosso-As. ii. p. 331 (1811); Schlegel, M. P.-Bas, *Lari*, p. 42 (1863); Sharpe and Dress. B. of Eur. pt. iv. (1871).

Larus atricilloides, Falk. Itin. iii. p. 355, t. 24, *fide* Gm. Syst. Nat. i. p. 601 (1788).

Xema minutus, Boie, Isis, 1822, p. 365.

Larus d'orbignyi, Audouin, Hist. Nat. de l'Egypte, pl. 9. fig. 3, Expl. p. 271 (1825).

Hydrocolæus minutus, Kaup, Nat. Syst. p. 113 (1829).

Larus nigrotis, Lesson, Tr. d'Orn. p. 619 (1831).

Chroicocephalus minutus, Eyton, Hist. R. Brit. B. p. 61 (1836); Bruch, J. f. Orn. 1853, p. 105.

Gavia minuta, Macgill. Hist. Brit. B. v. p. 613 (1852).

Hab. European coasts and occasionally inland (on passage and in winter); breeding in the marshes of Russia, and formerly in Gottland. Middendorff obtained it in May on the Lena, to the south of Jakusk, and as far east as the sea of Okotsk. Once in north India (*Irby*); North Africa to Egypt in winter.

Scopoli's description of *L. albus* applies fairly to this species, but it is not sufficiently precise to enforce the adoption of that name to the prejudice of a long accepted one like that of Pallas.

46. *LARUS PHILADELPHIÆ* (Ord). (Fig. 16.)

Sterna philadelphia, Ord, Guthrie's Geogr. 2nd Am. ed. ii. p. 319 (1815), *fide* Lawr., B. N. Am. p. 252.

Larus minutus, J. Sabine, App. Franklin's Polar Sea, p. 696 (1823); Sw. & Rich. F. Bor.-Am. Birds, p. 426 (1831), nec Pallas.

"*Larus capistratus*, Temm.," Bp. Specch. Comp. p. 69 (1828), nec Temm.

Larus melanorhynchus, Temm. Pl. Col. livr. 85, tab. 504 (1830), Chili?

Larus bonapartii, Sw. & Rich. F. Bor.-Am., Birds, p. 425, pl. 72

(1831); Thompson, B. of Ireland, iii. p. 317 (1851), near Belfast; Schlegel, Mus. P.-Bas, *Lari*, p. 41 (1863).

Xema bonapartii, Bp. Birds of Eur. and N. Am. p. 62 (1838).

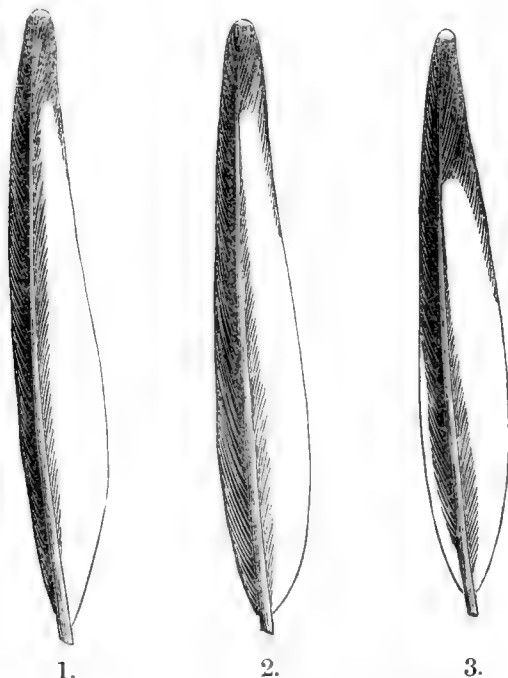
Chroicocephalus bonapartii, Bruch, J. f. Orn. 1853, p. 105, et 1855, p. 292.

Chroicocephalus subulirostris, Bp.; Bruch, J. f. Orn. 1853, p. 105 (type in Mainz Mus. examined, H. S.).

Gavia bonapartii, Bp. Naumannia, 1854, p. 213.

Gavia subulirostris, id. tom. cit. p. 213.

Fig. 16.



Three outer primaries of *L. philadelphia*, jr.

Chroicocephalus philadelphia, Lawr. B. N. Am. p. 852 (1858); Dall & Bann. Tr. Chicago Ac. 1869, p. 305 (Alaska); Newton, P. Z. S. 1871, p. 57, pl. iv. fig. 6, egg (Arctic America).

Gavia bonapartei, Blasius, J. f. Orn. 1865, p. 371.

Larus philadelphia, Allen, Am. Nat. iii. p. 643 (Salt Lake); Harting, Handbk. Brit. B. p. 172 (1872); Reid, Zoologist, 1877, p. 489 (Bermudas).

Hab. British North America and Alaska (in summer), breeding on the Yukon and neighbouring localities. In autumn it descends the coasts of America, as far as California on the west and North Carolina on the east; as a straggler it has visited the Bermudas and also the British Islands.

The drawing (fig. 16) of the outer primaries in the young shows wherein the pattern differs from those of allied species. In the adult the distinctions are yet more marked.

Genus RHODOSTETHIA, Macgill.

The distinguishing characteristic of this genus is the *cuneate tail*, in which respect the sole representative species is unlike every other. On account of this elongation of the central feathers of the tail, some systematists have placed it next to the *Stercorariinæ*; but it should not be inferred from this solitary point of resemblance that the two genera are at all closely related, their representatives being in other respects far apart. It is much to be desired that the sternum of the next specimen obtained should be preserved, as I believe this part of its structure has never been critically examined.

47. RHODOSTETHIA ROSEA, Macgill.

Larus roseus, Macgill. Wern. Soc. Trans. v. no. xiii. p. 249 (1824), descr. of sp. from Melville Peninsula; Jard. & Selby, Ill. Orn. vol. i. pl. xiv.

Larus rossii, Richards. App. Parry's 2nd Voy. p. 359 (1825), Melville Peninsula; J. C. Ross, App. Ross's 2nd Voy., Nat. Hist. p. 36 (1835), Felix Harbour, Boothia; Sw. & Rich. F. Bor.-Am. ii. Birds, p. 427 (1831); J. C. Ross, App. Parry's Narr. p. 195 (1828).

Rossia rosea (Macgill.), Bp. Comp. List, p. 62 (1838).

Rhodostethia rossi, Macgill. Man. Brit. Orn. pt. ii. p. 253 (1842).

Rhodostethia rossii, id. Brit. Birds, v. p. 618.

Rhodostethia roseus, Bruch, J. f. Orn. 1853, p. 106.

Rhodostethia rosea, Saunders, Ibis, 1875, p. 484 (jr.); Payer, Austrian Exp. ii. p. 91 (English transl.); Dresser, B. of Eur. pt. i. (1877)

"*Larus collaris*," MS., Schreibers, in Mus. Vindob.

Hab. Melville Peninsula, $69\frac{1}{2}^{\circ}$ N. lat., and Boothia, straggling to Greenland, once to the Faroes, once to Heligoland, and (on very questionable authority) once to England. This last specimen, which I have examined, has every appearance of having been mounted from a skin and not from the flesh. Ross and Parry state that it was seen to the north of Spitzbergen in about 82° N. lat.; but they did not obtain specimens, and no subsequent visitors to that district have observed it; more recently Lieut. Payer says that it was obtained about Franz-Josef Land.

There can be no doubt of the prior claim of Macgillivray's name for this species; but its imposition, in anticipation of that which Richardson intended to bestow on it, gave rise to a good deal of bad feeling at the time.

In 'The Ibis,' 1875, p. 484-487, I gave a description of the immature plumage of this Gull from two specimens in the Mainz Museum, and enumerated the eleven examples known to exist; to these may be added one more in Copenhagen, and one, of which Mr. O. Salvin has recently informed me, in the museum of Vienna: total thirteen specimens.

In reply to inquiries respecting the Vienna example, Hr. von Pelzeln informs me that it formed part of the collection made by Giesecké during his seven years' residence in Greenland, and came

into the possession of the Imperial Museum in 1818, when it received from Professor Schreibers the MS. and unpublished name of *Larus collaris*. In the interval between the publication of the 4to edition of Ross's 'Voyage to Baffin's Bay' and the later 8vo edition (both of which bear the date of 1819), Ross, or Leach (for, although under Ross's name, Leach was probably the real authority) heard of Schreibers's name, and, jumping at the conclusion that Schreibers's bird was *L. sabini*, inserted the synonym of *X. collaris* (Schr.) for that species in the 8vo edition. Had Schreibers's description been published, his name would have considerably antedated the present one.

Genus XEMA, Leach.

The real distinguishing character of this genus, as instituted by Leach, is the *forked tail*; but the name has been improperly employed by Boie and others for many other species. Leach, however, defined it most clearly; and a generic name should never be used in any other sense than that of the founder.

48. XEMA SABINII (Sabine).

Larus sabini, J. Sabine, Tr. Linn. Soc. xii. p. 520, pl. 29 (1818); J. Wilson, Ill. Ornith. pl. iii. (1831).

"*Xema sabini*, Leach," J. Ross, App. Ross's Voy. Baff. Bay, p. 57 (1819), 4to ed.; Steph. in Shaw's Gen. Zool. xiii. pt. i. p. 177, pl. 20 (1826); Eyton, Rarer Brit. B. p. 54 (1836).

"*Xema collaris* (Schreibers)," Ross in App. Ross's Voy. Baff. Bay, ii. p. 164 (1819), 8vo ed. (not in 4to ed.), nec Schreibers.

Gavia sabini, Macgill. Man. Brit. Orn. ii. p. 241 (1842).

Larus sabini, J. C. Ross, App. Ross's 2nd Voy. p. 37 (1835).

Larus sabinii, Richardson, App. Parry's 2nd Voy. p. 360 (1825); Sw. & Richs. F. Bor.-Am., Birds, p. 428 (1831); Middendorff, Sib. Reis., Zool. ii. p. 244, pl. xxiv. fig. 5, xxv. fig. 1 (young and egg), (1853).

Xema sabinii, Bruch, J. f. Orn. 1855, p. 292; Lawr. B. of N. Am. p. 856 (1860); Newton, P. Z. S. 1871, p. 57, pl. iv. fig. 5 (egg); Dresser, B. Europe, pt. xxxi. August 1874.

Larus sabinei, Schl. M. P.-Bas, *Lari*, p. 44 (1863).

Xema sabinei, Coues, B. of N.W. Am. p. 660 (1874-5); Reid, Zoologist, 1877, p. 490 (Bermudas).

Hab. Arctic America, breeding to the north of Upernavik, in Greenland, and then across to the west, breeding in Alaska (*Dall*); not rare in Plover Bay, Eastern Siberia (*Dall*), and breeding on the tundras of the Taimyr, north of 74° (*Middendorff*). In autumn it migrates southward; and many specimens have from time to time been obtained on the British coasts and those of the continent, as far east as Holstein, and on the French coasts. Most of these are birds of the year; but Dr. L. Bureau has an adult, with full black hood, captured on the coast of Brittany on August 25th, 1872. In America its southern range, as until now recorded, was down to New York on the east, and to Great Salt Lake, Utah, on the west—

roughly speaking, as far as 40° N. lat. ; but Messrs. Slater and Salvin have recently shown me a specimen from Prof. Steere's collection¹, Mus. University of Michigan, labelled "Macabi, September 1872," and on the card-label "Tumbez," Macabi Island being a little to the north of Huanchacho on the coast of Peru, in nearly 8° S. lat.—an enormous extension of its previously known limits. It is in adult plumage, with the exception of some dusky feathers on the nape; the forehead and head are white and devoid of the hood, which it was reasonable to suppose would only be worn during the breeding-season, although this is the first absolute *proof* I have had of this; the bill as in adults; the tail white and well-forked; feet rather faded. I imagine this to be a bird of the second year. This species has once occurred at the Bermudas.

The name of *X. collaris* was applied to this species as a synonym in the 8vo edition of Ross's 'Voyage' (1819), under the erroneous impression that this was the *L. collaris* to which Prof. Schreibers, then Director of the Vienna Museum, had given that MS. and unpublished name; but as a matter of fact that name belongs to an example of *Rhodostethia rosea*. For the elucidation of this point I am indebted to the kindness of Herr A. von Pelzel, who also informs me that the Vienna Museum is the possessor of what is probably the oldest specimen of this species in any European collection, it having been received, without any published name or description, from the Ornithological Institution of that city about 1806.

49. XEMA FURCATUM (Neboux).

Mouette à queue fourchue, Neboux, Rev. Zool. 1840, p. 290.

Larus furcatus (Neboux), Voy. 'Vénus,' Atlas, pl. x. (1846); Prévost & Des Murs, Voy. 'Vénus,' v. Ois. p. 277 (1855).

Xema furcatus, Bruch, J. f. Orn. 1853, p. 103.

Creagrus furcatus, Bp. Naumannia, 1854, p. 213; Bruch, J. f. Orn. 1855, p. 292; Salvin, Tr. Zool. S. ix. p. 506 (Galapagos).

Hab. The type of this species in the museum of Paris is said to have been obtained at Monterey, California, in November, by Dr. Neboux of the French frigate 'Vénus.' The only other specimen known to exist is in the British Museum, and was obtained during the voyage of H.M.S.'s 'Herald' and 'Pandora,' at Dalrymple Rock, Chatham Island, Galapagos group. The 'Herald' appears to have visited Chatham Island between the 11th and 16th January, a date which is worth bearing in mind, as the British-Museum specimen seems to be in fully adult plumage; the grey tint which pervades the lower part of the neck and breast in the Paris specimen, and which is probably a sign of comparative immaturity, having disappeared, leaving the hood well defined. But for the absence of the distinct collar at the bottom of the hood, and the narrow white band of feathers at the base of the upper mandible, this bird might be briefly described as a gigantic Sabine's Gull, the tail being rather more forked in proportion than in that species. It is certainly remarkable that, in spite of the researches of the American naturalists, no other speci-

¹ See above, p. 141.

men of this Gull should ever have been obtained in any part of California; and Mr. Salvin inclines to think the Californian locality an erroneous one, in view of similar mistakes known to have been made with the birds collected during the voyage of the 'Vénus.' It is on the other hand somewhat strange that if the head quarters of this Gull, of which the appearance is sufficiently striking to attract attention, are in the Galapagos group, none of the other visitors or naturalists should have brought any news of it.

Creagrus is one of Bonaparte's arbitrary and undefined genera; and there seems to be no structural difference to warrant the generic separation of this species from *Xema sabinii*.

In this paper I have from time to time acknowledged with much pleasure the assistance I have received from my friends and correspondents; and I have now to render my especial thanks to the authorities of the British and Cambridge Museums, and of the Smithsonian Institution, Washington, and to Dr. Brewer of Boston, to Professor Peters of Berlin, Professor Reinhardt of Copenhagen, M. Oustalet, M. Bouvier, Mr. O. Salvin, Mr. H. Seebohm, Mr. Harvie-Brown, Mr. Gervase Matthew, R.N., and Mr. E. Hargitt, for the opportunities they have severally afforded me of examining examples of rare species and also series of specimens.

P.S. (April 1st).—I take this opportunity of correcting an error in my paper on the *Sterninæ* (P. Z. S. 1876, p. 671) where two species are united under the name of *Anous cæruleus*. At that time I had not seen a specimen of the real *A. cæruleus*, Bennett; and that species and *A. cinereus*, Gould, are so very much alike that, until examples were available for comparison, the descriptions and plates might easily have been taken to refer to the same species in different stages of plumage. Seen by the light of further experience they appear to be distinct; and the following is their synonymy and habitat:—

ANOUS CÆRULEUS (Bennett).

Sterna cerulea, F. D. Bennett, Narr. Whaling-Voy. round Globe, ii. App. p. 248 (1840), Christmas Island, Pacific.

"*Sterne cendré*," Neboux, Rev. Zool. Oct. 1840, p. 291, et

Stolida cinerea, id. Voy. 'Vénus,' Atlas, pl. 9 (1846); nec *Anous cinereus*, Gould, P. Z. S. 1845 (Pacific, N. of Equator).

Sterna teretirostris, Lafresnaye, Rev. Zool. 1840, p. 242, et

Procelsterna tereticollis, id. Mag. de Zool. 1842, pl. 29: no locality; both described from a single specimen purchased from a dealer at Havre.

Anous parvulus, Gould, P. Z. S. 1845, p. 104 (described from a specimen obtained by Bennett at Christmas Island); Cassin, U.S. Expl. Exp., Birds, p. 393 (Honden Island, Low archip. 14° S., 138° W.).

Megalopterus plumbeus, Peale, U.S. Expl. Exp. p. 285 (1848), Honden Island.

Anous cinereus (Neb.), Finsch and Hartl. F. Central-Polynesiens, p. 239 (1867), Phœnix group, 3° 8' S., 171° W., nec Gould.

Hab. Pacific, from a little north of the Equator; Christmas Island; the Ellice group, 9° S., 179° E., whence there are two specimens in the British Museum recently obtained by the Rev. S. J. Whitmee; the Phœnix group; and Horden Island, Low archipelago.

ANOUS CINEREUS, Gould.

Pelecanopus pelecانoides, G. R. Gray, L. Birds Brit. M. iii. p. 180 (Australia, presented by Sir T. Mitchell).

Anous cinereus, Gould, P. Z. S. 1845, p. 104 (N.E. Australia); id. B. Australia, vii. pl. 76 (1848), Norfolk I. and N.E. coast Australia.

Procelsterna albivitta, Bp. Compt. Rend. xlii. 1856, p. 773; Gould, Hand-b. B. Austr. ii. p. 420 (1865); Gray, Hand-l. iii. p. 123 (1871).

Sterna cinerea, Schlegel, M. P.-Bas, *Sternæ*, p. 38 (1863), Australia.

Anous albivittatus, Finsch, P. Z. S. 1877, p. 776 (Eua, Friendly group).

Hab. Norfolk Island; N.E. Australia and the Tonga or Friendly group, in about 22° S., 175° W. It is presumably the species observed by Mr. E. L. Layard in the Fiji group.

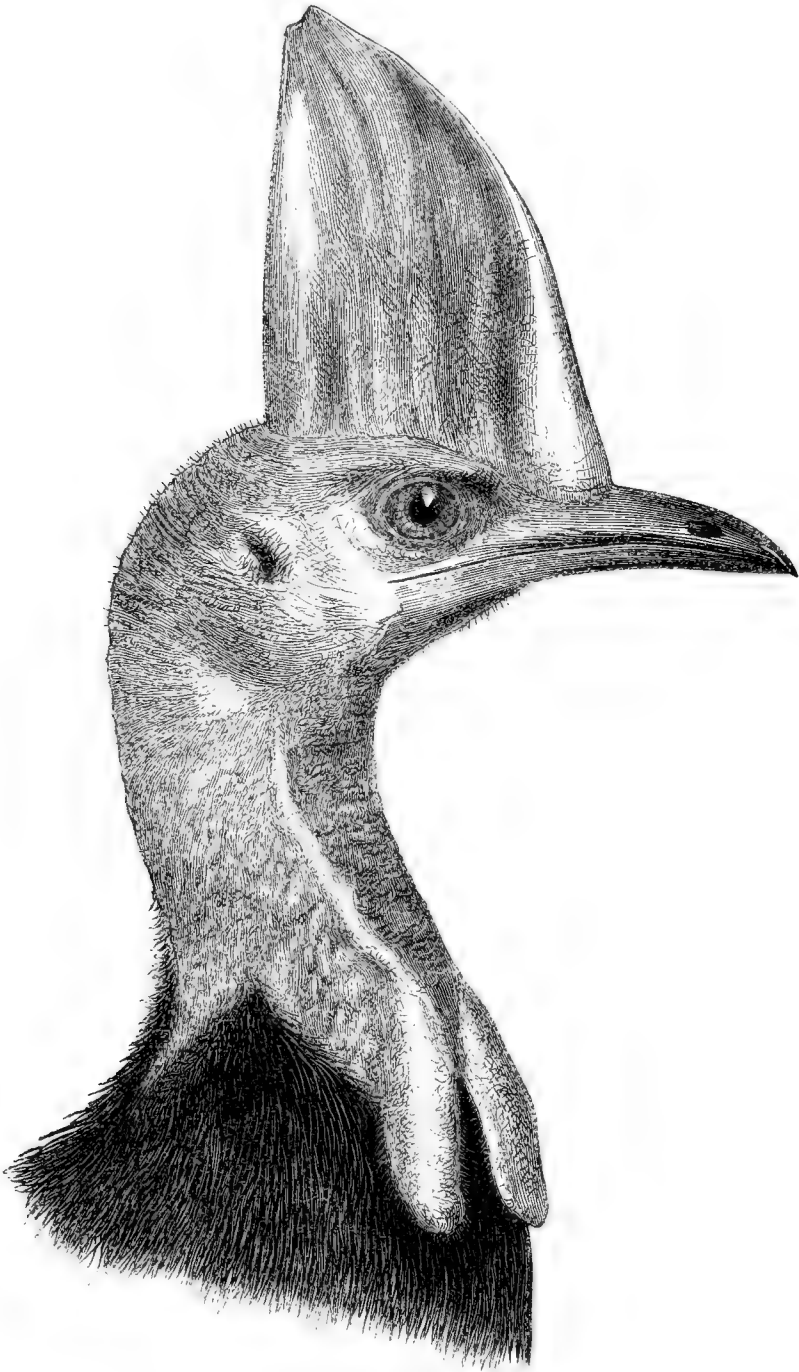
The range of these two species appears to be nearly parallel, that of *A. cæruleus* being the more northerly. *A. cæruleus* is smaller than *A. cinereus*, Gould, and is darker all over, especially on the underparts, which are blue-grey, whereas in *A. cinereus* they are nearly white. The differences are too great to be explained away as being due to age, and I admit the distinctness of the two species; but they are very closely allied. The fact of their being found in such close proximity within so limited an area is very remarkable.

February 19, 1878.

Prof. Mivart, F.R.S., V.P., in the Chair.

Mr. P. Geddes read a memoir on the mechanism of the odontophore in certain mollusca. In this paper the view of Cuvier that the movements of the radula depend upon those of the underlying cartilages was substantially revived. Arguments were adduced against the more recent theory of Prof. Huxley that it runs like a chain-saw, the cartilages merely forming a pulley-block. The use of bacteria as food by *Limnæus* was also described in the memoir, which will be published in the Society's 'Transactions.'

Mr. Sclater exhibited the skin of a fine adult Cassowary, which had recently been acquired for the collection of the British Museum. The specimen was labelled "Wandammen, May, 1876," and was



Head of *Casuarinus salvadorii*.

believed to have been obtained by the collectors of Herr Bruijn, of Ternate. Wandammen is situated on the western coast of the Bay of Geelvink, near the southern extremity¹.

Mr. Sclater stated that the only Cassowary of the present form known from this locality was the species shortly indicated by Beccari in his "Lettera Ornitologica" (Ann. Mus. Civ. Genova, vii. p. 717) as *Casuarius tricarunculatus*²; but there were no traces whatever of a third wattle in the present specimen.

The form of the casque in the present bird was nearly that of *C. australis*, the summit being elevated high above the head, and much compressed laterally, but forming almost a point at the summit instead of a longitudinal ridge (see fig., p. 213). The wattles were two, one on each side of the median line, closely approximating at their bases, but divided down nearly to their origin, and about three inches in length.

The species, which Mr. Sclater considered to be new to science, must, he said, be placed in the first section of his arrangement as given in P. Z. S. 1875, p. 87, next to *C. galeatus*, from which the form of the helmet distinguished it. From *C. beccarii* of the Arru Islands it might be known by the more completely divided neck-wattles.

The whole length of the body of the bird, from the tip of the casque to the tip of the tail, was about five feet; the tarsus measured 12·5 in., the middle toe 8·5 in. The distance from the commissure of the mandible to the top of the casque was 7·5 in., the distance from the gape to the extremity of the bill 7·5 in.³

A communication was read from Mr. F. Day, F.Z.S., containing the following remarks on Mr. Whitmee's paper on the manifestation of fear and anger in Fishes, read at the last meeting.

"At the last meeting of the Society (February 5th), Mr. Whitmee read a paper on the manifestation of fear, anger, &c., by Fishes, observing that a recent author, 'On the Expression of the Emotions,' had entirely omitted allusion to this class of Vertebrates, whilst, as regards anger, he believed that no observations had been recorded. I propose offering a few remarks upon the foregoing, as well as upon some other subjects touched upon by Mr. Whitmee.

"The means of expression in animals adverted to by Mr. Darwin (excluding those of the ears, which would be out of place in fishes) are:—sounds, vocally or otherwise produced; the erection

¹ See the chart of Geelvink Bay in 'Cosmos,' vol. viii. tabb. 3 & 10.

² The only known specimen of *C. tricarunculatus* was, as Count T. Salvadori kindly informs me, still living in Ternate in July last, where it was seen by M. Laglaize.

³ [Since these remarks were made I find that an example of this same Cassowary was exhibited by M. Oustalet at a meeting of the Association Scientifique de France on February 23rd, and the species named *C. salvadorii* (see Bull. Ass. Sc. de France, no. 539, vol. xxi. p. 349). I have therefore withdrawn my name in favour of that of M. Oustalet. I think it probable that the Cassowary from Southern New Guinea, formerly living in the Society's Gardens, which I referred (P. Z. S. 1875, p. 527) with some doubt to *C. beccarii*, is a younger individual of this same species.—P. L. S.]

of dermal appendages under the influence of anger or terror, which last would be analogous to the erection of scales and fin-rays in the class Pisces. Regarding special expressions, as those of joy, pain, astonishment, &c., we could hardly expect to find such so well marked in fishes as in some of the higher animals, in which the play of the features often affords us an insight into their internal emotions. Eyes¹ destitute of movable eyelids, cheeks covered with scales, or the head enveloped in dermal plates, can scarcely mantle into a smile or expand into a broad grin. We possess, however, one very distinct expression in fishes, which is absent or but slightly developed in many² of the higher animals—namely, change of colour. All are aware that when a fish sickens its brilliant colours fade, but less so how its colour may be augmented by anger, and a loss of it be occasioned by depression the result of being vanquished by a foe. Some forms also emit sounds when actuated by terror, and perhaps in times of anger; but of this last I possess no decided proofs.

“As regards manifestations of anger, Dr. Cantor makes the following remarks on the *Macropodus pugnax*³:—‘When the fish is in a state of quiet, with the fins at rest, the dull colours present nothing remarkable. But if two are brought within sight of each other, or if one sees its own image in a looking-glass, the little creature becomes suddenly excited, the raised fins and the whole body shine with metallic colours of dazzling beauty, while the projected gilt membranes, waving like a black frill round the throat, add something grotesque to the general appearance. In this state it makes repeated darts at its real or reflected antagonist. But both, when taken out of each other’s sight, instantly become quiet. . . . The Siamese are as infatuated with the combats as the Malays are with their cock-fights, and stake considerable sums, and sometimes their own persons and their families. The license of exhibiting fish-fights is farmed, and affords a considerable annual revenue to the King of Siam.’

“The foregoing extract shows anger in fishes demonstrated by change in colour and the erection of the fins and gill-membranes. I will now give an observation respecting the three-spined Stickle-back⁴. After a fight between two examples ‘a strange alteration takes place almost immediately in the defeated party: his gallant bearing forsakes him; his gay colours fade away; he becomes again speckled and ugly; and he hides his disgrace amongst his peaceable companions, who occupy together that part of the tub which their tyrants have not taken possession of; he is, moreover, for some time the constant object of his conqueror’s persecution.’ In fact we here perceive how the disgrace of defeat affects the spirits of the

¹ Couch (Illustrations, &c., p. 305) says, “The faculty of giving forth brilliant light from the eyes, as in a cat, is said to have been observed by fishermen in the Blue Shark.”

² Numerous examples of the Saurians are exceptions.

³ Cantor, Catal. Mal. Fish, 1850, p. 87. Sir J. Bowring, in his account of Siam, p. 155, gives a very similar account of the battles of these fishes.

⁴ Couch, ‘British Fishes,’ 1865, vol. iv. p. 172.

vanquished; this reacts on his health, and as a result his brilliant hues fade away. The conqueror, on the other hand, exulting in his victory becomes more resplendent; he does not forget his former triumph, and considers it no disgrace to occasionally lord it over his beaten foe.

"Fear is shown by fish in many ways. 'When hooked or netted they sometimes empty their stomachs by an instinctive act of fear, or to facilitate escape by lightening their load' (Owen, Comp. Anat. i. p. 419). There is not an angler unacquainted with the natural timidity of fishes, nor a keeper in charge of a salmon-pass, who does not know how easy it is for poachers to deter the salmon from venturing along the path raised expressly for his use.

"Amongst the coral-reefs of the Andaman Islands I found the little *Heliastes lepidurus* abundant. As soon as the water was splashed they appeared to retire for safety to the branching coral, where no large fish could follow them; so frightened did they become, that on an Andamanese diving from the side of the boat, they at once sought shelter in the coral, in which they remained until it was removed from the sea. In Burma I observed, in 1869, that when weirs are not allowed to stretch across the rivers (which would impede navigation), the open side as far as the bank, is studded with reeds; these, as the water passes over them, cause vibration, and occasion a curious sound alarming the fishes, which, crossing to the weired side of the river, become captured.

"Under the influence of fear or anger the well-known Climbing Perch of India (*Anabas scandens*) not only erects its spiny-rayed fins and its gill-covers, but also the scales on its body, even down to those along the base of the caudal fin¹; this to a less extent, perhaps, appears common to spiny-rayed forms.

"Hooker, alluding to Gulls, Terns, Wild Geese and Pelicans in the Ganges valley, observes, 'These birds congregate by the sides of pools and beat the water with violence, so as to scare the fish, which then become an easy prey—a fact which was, I believe, first indicated by Pallas during his residence on the banks of the Caspian Sea'². Fishes, under the influence of terror, dash about with their fins expanded, and often run into places which must destroy them. Thus droves and droves of Sardines in the East, impelled by the terror of pursuing Sharks, Bonitoes, Seir, and other voracious fishes, frequently throw themselves on the shores in enormous quantities. Friar Odoric, who visited Ceylon about 1320, says, 'There are fishes in those seas that come swimming towards the said country in such abundance, that for a great distance into the sea nothing can be seen but the backs of fishes, which, casting themselves on the shore, do suffer men for the space of three daies to come, and to take as many of them as they please, and then they return again into the sea'³.

"Fishes frequently show distinct signs of affection. Yarrell ('British Fishes') mentions how a person who had kept two

¹ 'Fishes of Malabar' (1865), p. 133.

² Himalayan Journals, vol. i. p. 80.

³ Hakluyt, vol. ii. p. 37.

small ones together in a glass vessel gave one away; the other refused to eat, and showed evident symptoms of unhappiness until his companion was restored: Pennant, how the River-Bullhead "deposits its spawn in a hole it forms in the gravel, and quits it with great reluctance:" General Hardwicke, how the Gouramy (*Osphromenus olfax*), in the Mauritius, forms a nest amongst the herbage growing in the shallow water in the sides of tanks. Here the parents continue to watch the place with the greatest vigilance, driving away any interloping fish. The amphibious walking fish of Mysore (*Ophiocephalus striatus*) appears to make a nest very similar to that of the Gouramy, and over it the male keeps guard; but should he be killed or captured, the vacant post is filled by his partner (Colonel Puckle). When very young the fishes keep with, and are defended by their parents, but so soon as they are sufficiently strong to capture prey for themselves they are driven away to seek their own subsistence (see 'Fishes of India,' p. 362). But it is not only these monogamous amphibious fishes which show an affection for their eggs and also for their fry, but even the little *Etroplus maculatus* has been observed to be equally fond of its ova. 'The eggs are not very numerous, and are deposited in the mud at the bottom of the stream, and, when hatched, both parents guard their young for many days, vigorously attacking any large fish that passes near them'¹.

"Although the proceedings of the members of the marine and estuary genus *Arius* and its allies show not quite so distinctly signs of affection, still it must be a well-developed instinct which induces the male to carry about the eggs in his mouth until hatched, and to remove them in this manner when danger is imminent. I have taken the ova just ready for the young to come forth out of the mouth and fauces of the parent (male) fish; and in every example dissected there was no trace of food in the intestinal tract.

"At many temples in India fishes are called to receive food by means of ringing bells or musical sounds. Carew, in Cornwall, is said to have called his Grey Mullet together by making a noise like chopping with a cleaver. Lacépède relates that some fishes, which had been kept in the basins of the Tuileries for more than a century, would come when called by their names, and that, in many parts of Germany, Trout, Carp, and Tench are summoned to their food by the sound of a bell. These instances are doubtless mostly due to the fishes having learnt by experience that on the hearing certain sounds they may expect food. But Lacépède mentions that some were able to distinguish their individual names; and the same occurs in India. Lieutenant Conolly remarked upon seeing numerous fishes coming to the Ghaut at Sidhnath to be fed when called; and on 'expressing our admiration of the size of the fish, "Wait," said a bystander, "until you have seen *Raghu*." The Brahmin called out his name in a peculiar tone of voice; but he would not hear. I threw in handful after handful of ottah (flour) with the same success, and was just leaving the ghaut, despairing and doubting,

¹ Jerdon, 'Madras Journal of Literature and Science,' 1849, p. 143.

when a loud plunge startled me. I thought somebody had jumped off the bastion of the ghaut into the river, but was soon undeceived by the general shout of "Raghu, Raghu," and by the fishes, large and small, darting away in every direction. Raghu made two or three plunges, but was so quick in his motions that I was unable to guess at his species¹.

"Although I have alluded to an increased brilliancy of colour being caused by anger, and a dull hue occasioned by terror or illness, there appears to be still another cause at work. During the breeding-season some species, such as *Periophthalmus schlosseri*, appear to become more brilliant, especially the males, as I have observed in my report on the freshwater fishes of Burma.

"Pallegoix states that in Siam the Dog's-tongue is a fish shaped like a Sole; it attaches itself to the bottom of boats, and makes a sonorous noise, which is more musical when several are stuck to the same boat and act in concert (vol. i. p. 193). These noises can scarcely be due to anger or fear. Sir J. Bowring (vol. ii. p. 276) also remarks upon having heard this fish, 'which sticks to the bottoms of the boats, and produces a sound something like that of a Jew's harp struck slowly, though sometimes it increases in loudness, so as to resemble the full sound and tones of an organ. My men have pointed me out a fish about four inches long as the author of the music.'

"Some years since, at Madras, I obtained several specimens of a freshwater Siluroid fish (*Macrones vittatus*) which is termed 'the fiddler' in Mysore. I touched one which was on the wet ground, at which it appeared to become very irate, erecting its dorsal fin, making a noise resembling the buzzing of a bee, evidently a sign of anger or terror. Having put some small Carp into an aquarium containing one of these fishes, it rushed at a small example, seized it by the middle of its back, and shook it like a dog killing a rat; at this time its barbels were stiffened out laterally like a cat's whiskers².

"Many fish, when captured, make noises, perhaps due to terror. Thus the *Caranx hippos*, *Tetrodon*, and others grunt like a pig. Darwin (Nat. Journ. vol. vii.) remarks on a *Silurus* found in the Rio Parana, and called the Armado, which is remarkable for a harsh grating noise when caught by hook and line; this noise can be distinctly heard when the fish is beneath the water.

"Aristotle and Ælian were aware of this faculty in some of the fishes of the Mediterranean³.

"The Cuckoo-Gurnard (*Trigla pini*) and the Maigre (*Sciæna aquila*) utter sounds when taken out of the water⁴; and Herrings, when the net has been drawn over them, have been observed to do

¹ "Observations on the Past and Present Condition of Onjein," 'Journal of the Asiatic Society of Bengal,' vi. p. 820.

² 'Fishes of India,' p. 449.

³ See 'De Animal.' lib. iv. cap. ix.; Ælian, lib. x. cap. xi.; Pliny, lib. ix. cap. viii. and lib. xi. cap. xviii.; Athenæus, lib. vii. cap. iii. & vi.

⁴ Yarrell, 'British Fishes,' i. pp. 44-107.

the same: 'this effect has been attributed to an escape of air from the air-bladder; but no air-bladder has been found in the *Cottus*, which makes a similar noise.'

"The Lesser Weaver buries itself in the loose soil at the bottom of the water, leaving only its head exposed, and awaits its prey. If touched, it strikes upwards or sideways; and Pennant says it directs its blows with as much judgment as a fighting-cock (Yarrell, vol. i. p. 26). Fishermen assert that wounds from its anterior dorsal spines are more venomous than those caused by the spines on its gill-covers.

"As regards fighting, I should suppose that, unless some portion of the body is peculiarly adapted for this purpose, as the rostrum of the Sword-fish, or the spine on the side of the tail in the Lancet-fishes, we must chiefly look to the armature or covering of the jaws for weapons of offence.

"And this naturally leads us on to ask if, as suggested by Mr. Whitmee, 'the chief purpose served by fishes' spines is protection against the attacks of those of the class which are carnivorous.' The first inquiry is, Do the carnivorous forms most abound amongst *Acanthopterygians* or *Malacopterygians*? The spiny-rayed forms (speaking as a whole) have the teething far better developed than the soft-rayed Carps of the fresh waters, or the Herrings of the sea, the former (spiny-rayed forms) being the most carnivorous, the latter (or soft-rayed fish) being preyed upon by the former, and by the *Elasmobranchii*.

"I observed¹, 'It may not be amiss to point out that the Acanthopterygian or spiny-rayed fishes appear to be most numerous in the ocean (preying upon their articulated-rayed neighbours, the Clupeidæ, &c.); but as we examine waters more inland, the Salmonidæ or Cypriidæ usurp their place, these latter not being possessed of spinate, but merely articulated rays. A maritime residence appears most adapted for the Acanthopterygian or spiny-rayed fishes, a fresh-water inland one to the Malacopterygians or spineless forms.'

"Spinate dorsal and anal fins being much more frequent in the carnivorous and voracious forms than in their weaker neighbours leads me to suppose that they must have some other function than protection of the fish from its enemies. One of these is probably to guard the fin-membrane from injury, for which purpose spines are much better adapted than rays in fast-swimming species. One has only to witness how commonly the spineless anal fins of Clupeoids and Siluroids are found injured in the tropics, to feel sure that much of this is owing to the absence of spinate protection. We do not see the same injury existing to any thing like a similar extent in Teleosteans whose fins are armed with strong spines; but in the intermediate forms, as the first dorsals of Sier-fishes (*Cybius*), the weak spines of the fins are frequently injured.

"Mr. Whitmee remarked that in serious attacks fish 'always turned suddenly round and lashed at one another with the caudal fin;' and he continued that he believed *serious fighting is always*

¹ 'Journal of the Linnæan Society, Zoology,' vol. xiii. p. 111.

done with the tail. Here I am unable to concur. Fish, the same as other animals, when they commence to fight, employ that portion of the body most suited to such a purpose. Thus the Perch will employ his teeth, the Sword-fish his elongated snout, the Lancet-fish the spine at the side of its tail, the Siluroid may use his dorsal or pectoral spine. Instances of all these modes of attack may be referred to.

"Continuing Couch's illustration of the Stickleback, he observes, 'The bite of these little furies is so severe that I have frequently known it, when inflicted on the tail, produce mortification and, consequently, death. They also use their lateral spines (ventral fins) with such fatal effect that, incredible as it may appear, I have seen one during a battle absolutely rip his opponent quite open, so that he sank to the bottom and died.'

"That the Sword-fish employs his sword-like projection for this purpose is well known; frequent examples occur of his driving that formidable weapon into ships, whilst, according to Swainson, he is very fierce, and attacks a Whale whenever he encounters one; other observers, however, represent the Sword-fish as gentle and inoffensive except to Whales.

"The Lancet-fish as it swims past its enemy tears up an open wound.

"As regards the Siluroids we have more than one mode of attack; but I do not know of any Siluroid that employs its tail for this purpose. In one of the Siluroids of the Ohio 'the first ray of the dorsal is formed of a very strong, sharp spine, which the animal uses to kill others of a smaller size; for this purpose it gets beneath the fish it intends to attack, and then, suddenly rising, wounds it repeatedly in the belly.'

"Mr. Whitmee supposes that most carnivorous fish capture their prey by outswimming them; but to this there are numerous exceptions. The Angler, or Fishing Frog (*Lophius piscatorius*), 'while crouching close to the ground, by the action of its ventral and pectoral fins, stirs up the sand and mud; hidden by the obscurity thus produced, it elevates its appendages (situated on the upper surface of the head), moves them in various directions by way of attraction as a bait, and the small fishes approaching either to examine or to seize them, immediately become the prey of the Fisher' (Yarrell). In India we find a freshwater Siluroid (*Chacalophioides*) which 'conceals itself among the mud, from which, by its lurid appearance, and a number of loose filamentous substances on its skin, it is scarcely distinguishable; and with an immense open mouth it is ready to seize any small prey that is passing along' (Ham. Buchanan). In March 1868 I obtained a fine example of *Ichthyscopus inermis* ('Fishes of India' p. 261), which I placed in water having a bed of mud: into this it rapidly worked itself, first depressing one side and then the other, until only the top of its head and mouth remained above the mud, whilst a constant current was kept up through its gills. It made a noise, half snapping and half croaking, when removed from its native element. This sound I consider most probably due to fear. Some fish, in

short, invariably seize their prey with their mouths, and that without calling the caudal fin into play. In fact, a stroke with the tail appears sometimes to denote contempt in fishes; it is not rare that anglers find fishes sometimes swim up to their bait, which they not only refuse, but, giving it a lash with their tail, decline to rise any more. This may, however, be a symptom of curiosity, which is largely developed in the finny tribe.

"I might multiply instances from many authors, but consider those adverted to are sufficient to show that various ichthyologists have remarked upon the emotions of anger and terror in fishes being shown by the erection of their dermal appendages and gill-covers, as well as by changes of colour, whilst terror induces some species to emit sounds that are not commonly perceived; that fishes sometimes show affection for their partners in captivity, mourning their removal; that they may be tamed sufficiently to come to a recognized sound, even to individual names that have been bestowed upon them; and that some species have an instinctive affection for their eggs and young, which they guard against intruders with the greatest determination.

"At the present time, in the Royal Westminster Aquarium, is a live example of the Electric Eel (*Gymnotus electricus*) which has in its electric organs the means of showing when it is affected by anger or terror. Some consider this curious property is for protection against Alligators; it is certainly used against fishes for the purpose of obtaining food; but when we remember how, when the Indians drive in horses and mules to the waters infested by the Eels, they immediately attack them, we must admit that such cannot be for the purpose of preying upon them, but is due to anger or terror at being disturbed."

Mr. Whitmee being unable to attend, the Secretary read the subjoined reply to Mr. Day's remarks.

"By the courtesy of the Secretary I have seen Mr. Day's comments on my paper. As I cannot attend the meeting to-morrow evening, I crave the liberty of presenting two or three written observations.

"1. My paper was written in Samoa in 1875; and my position there, of course, prevented me from having access to the whole literature of this subject. I was aware of the conduct of the Stickleback in guarding its nest, and also of similar conduct in some other fishes. But my object was to show, in opposition to a view quoted, that fishes, as a class, manifest as much feeling as most other animals. In stating that I had not met with observations showing this, I did so as an excuse for presenting a paper which I feared possessed little intrinsic value. I am glad the paper has led Mr. Day to bring forward so much evidence in confirmation of the view I advocated.

"2. Mr. Day gives a more general application than I intended to my observations about the mode of fighting with the tail. I stated an observed fact, viz. that certain fishes in my aquarium, when fighting, lashed at each other with their tails. From this I inferred

that such a mode of attack might be common among most, not all, fishes. Of course, those which possess more effective weapons in another part of the body would not resort to such a mode of warfare.

“3. As to the way in which carnivorous fish capture their prey, I said, ‘doubtless *most* do it by outswimming them,’ and not that *all* do this. In P. Z. S. for 1875, p. 545, I mentioned an observed fact of an *Antennarius multiocellatus* angling for small fish. Of course no one would ever imagine that the slow-moving fish mentioned by Mr. Day would outswim their prey.”

1. Notes on the Anatomy of *Tolypeutes tricinctus*, with Remarks on other Armadillos. By A. H. GARROD, M.A., F.R.S., Prosector to the Society.

[Received January 14, 1878.]

The Society purchased, on the 3rd of October 1877, a young female living specimen of the Apar (*Tolypeutes tricinctus*), which was the first example of the species exhibited alive in the Gardens, and probably the first ever brought alive to this country. It was in bad health on its arrival, and, never recovering, died, without any visible lesion, on the 27th of December following. Its death has given me an opportunity of determining some of the most important points in its anatomy, which may be accepted as a supplement to Dr. Murie's valuable and elaborate memoir on *Tolypeutes conurus* in the ‘Transactions of the Linnean Society’¹.

The measurements of the specimen under consideration are as follows:—

	inches.
From tip of nose to base of tail	12·55
Length of head	2·8
Length of tail	2·1

from which it is evident, on comparison with the table of measurements of the specimens in the national collection given below, that the individual was not adult, but fairly grown.

The differences between the two known species of the genus *Tolypeutes* are so slight that it may be worth while referring to them before going further. It is to M. Geoffroy Saint-Hilaire that we owe the discovery of the second species (*T. conurus*); and his most lucid description is to be found in the ‘Comptes Rendus’ for 1874². Therein the history of the Apar is fully expounded, references being given to all previous important accounts of the animal.

It is in the central portion of the cephalic shield that the most important peculiarities are to be seen. The marginal plates of the posterior two thirds of this shield form a regular series, and enclose other larger plates—namely, a posterior median plate, followed ante-

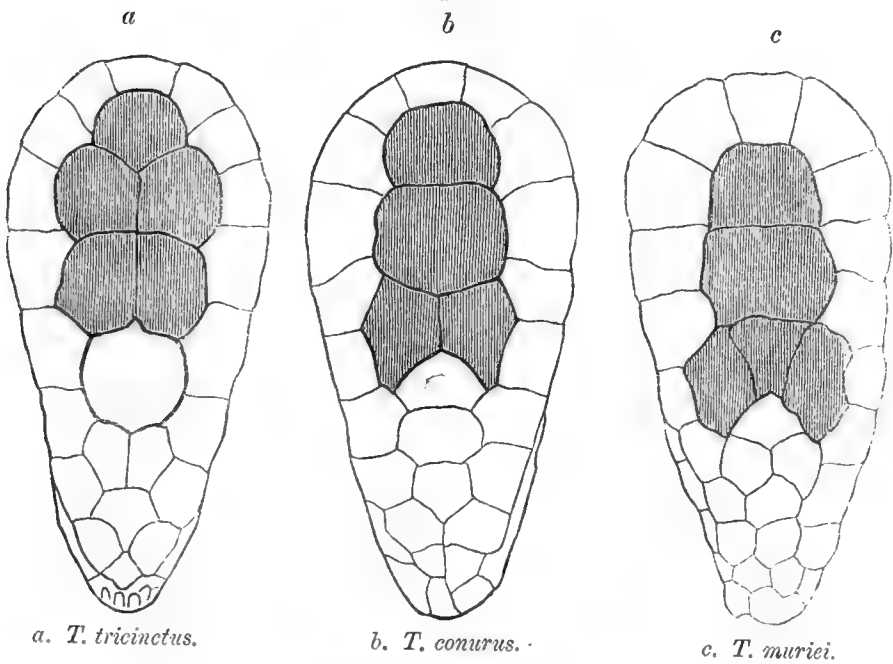
¹ Vol. xxx. p. 71.

² Vol. xxiv. p. 572.

riorly in *T. tricinctus* by a pair of plates, in front of which, again, is another smaller pair.

In *T. conurus* the posterior median plate is followed by a single larger plate, and that by a pair of plates the transverse breadth of which is greater than that of the second median plate behind and in contact with it. In fig. 1, *a* and *b* exhibit these features, as well as their effect in causing the characteristic difference in the general shape of the cephalic shield of the two species—that in *T. tricinctus* being triangular, with its greatest breadth opposite the posterior of the pairs of plates, that in *T. conurus* being oval, with its greatest breadth opposite the single pair of plates.

Fig. 1.

*a. T. tricinctus.**b. T. conurus.**c. T. muriei.*Cephalic shields of *Tolypeutes*.

On referring to the beautiful illustrations given by Dr. Murie of the animal dissected by him¹, the cephalic shield of which is here reproduced in outline (fig. 1, *c*), it is evident that it does not correspond with either of those above described; and I may mention that there is a skin in the national collection (Brit. Mus. spec. 140 *a*) which agrees with it. In these the posterior median plate is followed by a second larger median plate, as in *T. conurus*, and that, more forward, by a small median plate in association with two small lateral plates. The difference makes me feel justified in establishing a third species of *Tolypeutes*, based upon Dr. Murie's figure, together with the skin in the national collection above referred to, for which I would suggest the name *Tolypeutes muriei*, after the author who has

¹ Trans. Linn. Soc. vol. xxx. pl. xxxi. fig. 3.

so well described its structure. Dr. Murie's figure, being based upon a photograph of the specimen, is thoroughly reliable.

M. Is. Geoffroy St.-Hilaire has so well differentiated *T. tricinctus* and *T. conurus* that it will be necessary for me only to mention that in the former there are five toes on the fore feet (as in the Society's specimen in my possession), whilst in *T. conurus*, following the account of the discoverer of the species, there are "trois doigts seulement, avec le rudiment d'un quatrième, aux pattes antérieures (ce rudiment représente le doigt interne). Point de doigt externe." The same remarks apply to *T. muriei*; for in the specimen in the British Museum there are four toes on each fore foot, whilst in Dr. Murie's example the pollex was not present.

The tail, with its infundibuliform armature, is distally covered with four pairs of small rows of plates, arranged in longitudinal lines, there being one superior and one inferior pair, one supero-lateral and one infero-lateral. In *T. tricinctus* the whole organ is flattened from above downwards; in *T. conurus* and *T. muriei* it is not so. Two and a quarter inches appear to be its extreme length along its dorsal curve in all but the largest individuals, where it may reach two and a half inches. I do not find that the different species differ in the length of this appendage, which is correlated, as far as its length goes, with the length of the head, on the right side of which it always lies when the animal is rolled up¹.

I can find no important differences among the species in the anterior portion of the carapace. In the three free transverse semizones *T. conurus* and *T. muriei* agree, and differ from *T. tricinctus* in that the terminal or marginal lateral scutes of each zone (which with the scute above on each side of each zone are less tuberculated than the rest, to reduce the friction when the animal rolls itself up) are more detached from the second scute, are more rounded, and are smaller proportionately.

In the posterior moiety of the carapace of *T. conurus* and *T. muriei* fifteen, sixteen, seventeen, or eighteen rows of scutes can be counted along the middle line from before backwards if the marginal scutes are included in the numeration; in *T. tricinctus* I never find more than thirteen or fourteen rows.

In *T. tricinctus* only there is a triangular area composed of small scutes, with its apex directed downwards, and basally in contact with the cephalic shield, which interpolates itself between the eye and ear on each side.

The following measurements of the specimens of the different species in the national collection may prove of service in determining the proportions of each. They demonstrate that the head is decidedly shorter than the anterior moiety of the carapace in *T. tricinctus*, whilst in *T. conurus* and *T. muriei* it is nearly always longer; that in *T. tricinctus* the head is more than half the length of the posterior moiety of the carapace, whilst in the two other species it is not so much as half that measurement.

¹ Dr. Murie figures the tail on the left of the head (*l. c.*)—the photograph from which the drawing was made not having been reversed, most probably.

	<i>T. tricinctus</i> .	<i>T. tricinctus</i> .	<i>T. tricinctus</i> .	<i>T. conurus</i> .	<i>T. conurus</i> .	<i>T. conurus</i> .	<i>T. conurus</i> .	<i>T. muriei</i> .	<i>T. muriei</i> .
Length of cephalic shield	in. 3	in. 2·9	in. 2·9	in. 2·75	in. 2·75	in. 2·75	in. 3	in. 3·1	in. ?
Length of anterior shield	3·2	3·3	3·4	2·75	2·55	2·65	3·1	2·8	2·65
Length of posterior shield	5·8	5·75	5·7	5·5	5·75	5·8	6·75	6·3	6·3
Length of tail (upper aspect).	?	2·25	2·25	2·2	2·2	2·2	2·5	?	?
	B.M. 49, 3, 12, 1.	B.M. no. 140 b.	B.M. no. 140 c.	B.M. no. 140 h.	B.M. 52, 8, 24, 10.	B.M. 46, 9, 28, 35.	B.M. e.	B.M. no. 140 a.	Dr. Murie's specimen.

It should also be mentioned that in *T. tricinctus* there is much more hair on the carapace at the posterior margins of the scutes than in the two other species, and that it has only eight teeth on each side of each jaw, whilst both in *T. conurus* and in *T. muriei* there are nine.

All the specimens of the genus *Tolypeutes* agree, as far as my experience goes, in the manner in which their cervical vertebræ ankylose—the atlas, together with vertebræ 5, 6, and 7 alone being free.

Concerning the geographical distribution of the genus *Tolypeutes*, the localities whence both Dr. Murie's and my specimen were obtained cannot be determined, they having been both purchased of dealers.

The specimen 140 a in the British Museum, of *T. muriei*, was presented by Burnett and Fitzroy, and therefore must have probably come from some part of the coast of La Plata or Patagonia.

A national specimen of *T. conurus* is marked as having come from Bolivia. Another of the same species, in the museum of the Royal College of Surgeons, was presented by Mr. Darwin.

The type specimen of *T. conurus* was obtained in the province of Santa Cruz de la Sierra, Bolivia; and for a cast of its cephalic shield, from which I have been able to determine the correctness of the nomenclature above adopted, I have to express my very best thanks to Professor Alphonse Milne-Edwards.

The species described by Burmeister¹ from Buenos Ayres is *T. conurus*.

Azara found a four-toed species in Paraguay; it was therefore not *T. tricinctus*.

The brain of no species of *Tolypeutes* has been described, Dr. Murie having met with an accident with his specimen. By Gervais a cast is figured of the interior of the skull, which demonstrates the

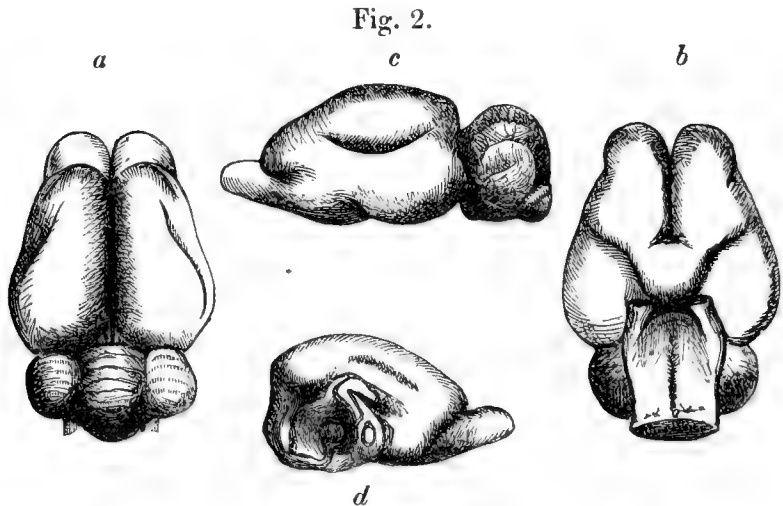
¹ Anales del Museo Publico de Buenos Ayres 1871 tom. ii. p. 117.

large size of the olfactory lobes¹, together with its general proportions, and but little more.

Our knowledge of the brain of the *Dasypodidæ* has been much increased by a paper from the pen of Prof. Turner in the first volume of the 'Journal of Anatomy and Physiology'² on the brain of *Dasypus sexcinctus*, in which the bibliography of the subject is fully given.

The general appearance of the brain of *Tolypeutes tricinctus* differs but little from that of *Dasypus sexcinctus*, whilst in surface-markings it much more closely resembles that of *Tatusia peba*, as figured by Rapp³, being comparatively simple in its gyration. There is not that difference in the breadth of the anterior and posterior portions of the cerebral hemispheres which is found in *Dasypus sexcinctus*.

The Sylvian fissure is only represented by an open and very shallow angle, above which, on the surface of the hemisphere, is a slight, partly encircling, shallow groove of some length, separated from it by a very short distance (*vide* fig. 2, c).



Brain of *Tolypeutes tricinctus*.

The large olfactory lobes are much broader than they are deep.

On the surface of each cerebral hemisphere there are two sulci. One of these, the anterior, is horizontal, and divides the frontal lobe into an upper and a lower part. Its outer extension is nearly to the lateral margin, not going backwards more than one fifth the length of the hemisphere. Internally it ceases on the flat interhemispherical surface as far backward as its outer end (*vide* fig. 2, a).

The second sulcus is upon the superior cerebral surface, running from behind forwards and inwards. Posteriorly it commences at the outer posterior angle of the hemisphere a short distance from its ex-

¹ "Les formes cérébrales des Edentates," Nouv. Archiv. du Muséum, 1869, tom. v. pl. ii. fig. 8.

² 1867, p. 313.

³ Edentaten, tab. viii. fig. 3.

tremity. It does not, therefore, turn round the posterior end of the hemisphere to become continuous with the fissure of the hippocampus, as it does in *Dasypus sexcinctus*. Anteriorly it ceases in the middle of the superior surface of the frontal lobe, a short distance behind the convex margin of its upper moiety, and at about the transverse level of the ends of the anterior sulcus. The general direction of this sulcus is horizontal when viewed from the side, it being slightly curved, with its convexity downwards.

The sulcus present on the superoparietal cerebral surface of *Dasypus sexcinctus* is entirely absent in *Tolypeutes tricinctus*.

The internal cerebral surface very closely resembles that of *Dasypus sexcinctus* as figured by Prof. Turner. The corpus callosum is short, pointed in front, inclined obliquely upwards and backwards, being rounded and thick posteriorly, where it becomes continuous with the psalterium of the foruix. The anterior commissure is well developed. The sides of the corpus callosum are very much upturned. The calloso-marginal sulcus is feebly represented, being of about the length of the corpus callosum, and situate at a level a little anterior to it (*vide* fig. 2, *d*).

The corpora quadrigemina are large, and separated by a deep longitudinal fissure, the pineal gland being extremely small. In the natural position of the spirit-preserved specimen it was quite impossible to cover the testes by the posterior margins of the cerebral hemispheres, which leads me to think that Prof. Turner is hardly justified in his correction of Tiedemann, Cruveilhier, and Stannius, who all say that the corpora quadrigemina are uncovered by the cerebrum (in part at least) (*vide* fig. 2 *a*).

The median and lateral lobes of the cerebellum are nearly equal in size. The medulla is very large, and the fifth nerve is enormous. The optic nerves and commissure are insignificantly small. I could not see any corpora albicantia.

With reference to the visceral anatomy of *Tolypeutes tricinctus*, the tongue was $2\frac{1}{4}$ inches long in my specimen, and $\cdot 4$ inch broad at the base. It is soft and elongate-triangular (lanceolate) in shape, flattened above. No circumvallate papillæ are visible, the others being inconspicuous and uniformly distributed. On the palate there are nine larger and smaller transverse ridges on each side, the interval between the last pair of molar teeth being smooth. The number of teeth is eight above and seven below, on each side.

The epiglottis is slightly indented by a notch in the middle line; and the soft palate embraces it, so that the rima glottidis opens into the posterior nares, as in so many mammals, during ordinary respiration. A tonsilic pit exists on each side of the fauces.

The lungs are divided into four lobes on the right side, and two on the left. In most Dasypodidæ there are three lobes on the left side; but in the animal under consideration the two upper were blended. Three is said by most authors to be the number of lobes of the right lung; but I always find a fourth azygos lobe as well, hidden behind the heart, in the genera *Dasypus* and *Xenurus*, absent in *Tatusia*. Dr. Murie's figure of the lungs scarcely differs, ex-

cept in the absence of division of the left upper lobe, from my specimen.

The *stomach* is of the ordinary shape, with but a short lesser curvature. It is muscular, but not powerfully so, at its pyloric end. Along its greater curvature, when laid out flat, it measures $6\frac{1}{4}$ inches.

The liver has the lateral fissures deep, whilst the umbilical fissure is comparatively insignificant. The gall-bladder is partly, but not deeply, embedded in the abdominal surface of the right central lobe. The Spigelian lobe forms a short rounded cone, very broad at its base. According to the method elsewhere suggested by me¹, the formula of the bulk of the lobes is thus expressed:—

$$\text{L.L. } 1\frac{1}{2} > \text{R.C.} > \text{R.L. } 2 > \text{L.C. } 2 > \text{C.}$$

The small intestines measure 75 inches, the large intestine 6·5 inches. There are no cæca; but there is an abrupt change in the diameter of the alimentary canal at the ileo-cæcal valve, as in *T. conurus* and in the genus *Tatusia*.

The *uterus* is triangular, the fundus being perfectly straight when viewed from in front, and the Fallopian tubes joining it at the extreme upper and outer angles. The conical clitoris is an inch long; and the genito-urinary orifice is a longitudinal slit 0·3 inch from its apex.

Among the various papers on the visceral anatomy of the Dasy-podidæ I may refer to Hunter's description of *Tatusia peba*², Professor Owen's account of the same species, and of *Dasypus sexcinctus*³, and Hyrtl's monograph of *Chlamydophorus truncatus*⁴. To these I may add my own notes on *Xenurus unicinctus*, together with those upon the other species which have passed through my hands, as an assistance towards the determination of the affinities of *Tolypeutes*.

In *Xenurus unicinctus* the gall-bladder is so deeply embedded in the tissue of the right hepatic lobe that it nearly penetrates to its diaphragmatic surface. This I find to be the case in *Dasypus villosus*, *D. sexcinctus*, and *D. vellerosus*; whilst in *Tatusia hybrida* and *Tolypeutes tricinctus* it is much less sunk. The cystic duct is very much twisted in a corkscrew manner. The proportional bulk of the hepatic lobes is almost exactly the same as in *Tolypeutes tricinctus*. In *Tatusia peba* and *T. hybrida* the right central lobe is the largest, not the left lateral. In *Tatusia* the umbilical fissure is less significant than in *Dasypus*, *Xenurus*, or *Tolypeutes*.

The junction of the large and small intestines in *Xenurus* is as in *Tatusia peba* and *T. hybrida*, there being no cæcal dilatations, as there are in *Dasypus villosus*, *D. sexcinctus*, *D. minutus*, and *D. vellerosus*.

The following measurements of the intestines demonstrate their relative lengths:—

¹ P. Z. S. 1875, p. 57.

² 'Essays and Observations on Natural History,' 1861, vol. ii. p. 182.

³ P. Z. S. 1831, pp. 141 and 154, and P. Z. S. 1832, p. 130.

⁴ Denkschr. der kais. Akad. Wien, ix. 1855.

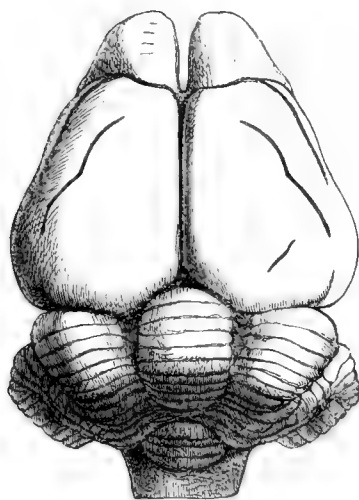
	<i>Tatusia peba</i> , adult ♂.	<i>Tatusia peba</i> , adult ♀.	<i>Xenurus un-</i> <i>cinctus</i> , ♂.	<i>Dasypus vil-</i> <i>losus</i> , ♂.	<i>Dasypus mi-</i> <i>nutus</i> , ♀.	<i>Dasypus vel-</i> <i>erosus</i> .
Small intestine.....	ft. 16·3	ft. 14·6	ft. 18·5	ft. 11·5	ft. 5·1	ft. 4·3
Large intestine.....	1·5	1·5	1·6	1·25	7·0	0·66

In *Xenurus uncinatus* the vesiculæ seminales are not present, the distal ends of the ureters being enlarged. Cowper's glands and a prostate are present; and the apex of the glans penis is not trilobed as in *Tatusia*, but simple, as in *Dasypus* and *Tolypeutes*. The penis itself is huge. In *Tolypeutes*, according to Dr. Murie, the vesiculæ seminales are also absent.

In *Tatusia peba* and *T. hybrida* the vesiculæ seminales are large, and there is a pair of lateral lobes to the apex of the glans penis. The whole penis is proportionally smaller in *Tatusia* than it is in *Dasypus*, as is the clitoris. In these respects *Tolypeutes* and *Xenurus* agree with *Dasypus*, my experience being, as far as the male organs of *Dasypus* are concerned, confined to *D. sexcinctus*.

In *Dasypus*, *Tolypeutes*, and *Xenurus* there are only a pair of nipples, in *Tatusia* there are two pairs. In *Xenurus uncinatus* the uterus is triangular, as in *Dasypus* and *Tolypeutes*.

Fig. 3.

Brain of *Xenurus uncinatus*.

The brain of *Xenurus* is intermediate in its form and surface-markings between *Dasypus* and *Tolypeutes*. The hemispheres, when

viewed from above, are considerably broader posteriorly than anteriorly, as in *Dasypus*. The olfactory lobes are large; and the corpora quadrigemina are completely covered. The oblique sulcus on the back part of the superior surface of each hemisphere, which runs forwards and outwards, is present, as in *Dasypus*, but it is very short. The two other sulci are well developed, that in the frontal portion being longer than in either *Dasypus* or *Tolypeutes*. The upper or second sulcus runs from in front—near the anterior internal angle of the superior surface of the hemisphere—backwards and outwards for some distance, but not nearly as far as the posterior margin of the cerebrum, it ceasing a little behind the level of the outer extremity of the posterior oblique sulcus. In this respect it resembles *Tolypeutes* and differs from *Dasypus* (*vide* fig. 3).

It is to Prof. Owen that we are indebted for our knowledge of the great differences between the colic cæca and female generative organs of the genera *Tatusia* and *Dasypus*. These facts, when taken in association with other characters above brought forward and referred to, may be thus tabulated:—

<i>Dasypus.</i>	<i>Tolypeutes.</i>	<i>Xenurus.</i>	<i>Chlamydomorphus.</i>	<i>Tatusia.</i>
Ears apart.	Ears apart.	Ears apart.	Ears apart.	Ears approximate.
Nipples 2.	Nipples 2.	Nipples 2.	Nipples 2.	Nipples 4.
Uterus triangular.	Uterus triangular.	Uterus triangular.	Uterus pyriform.	Uterus pyriform.
External genitalia enormous.	External genitalia enormous.	External genitalia enormous.	External genitalia small in female.	External genitalia not excessive.
Glans penis simple.	Glans penis simple.	Glans penis simple.	?	Glans penis trilobed.
Vesiculæ seminales absent.	Vesiculæ seminales absent.	Vesiculæ seminales absent.	?	Vesiculæ seminales present.
Lateral colic cæca present.	No colic cæca.	No colic cæca.	Lateral colic cæca present.	No colic cæca.
Azygos lobe of lung present.	Azygos lobe of lung present.	Azygos lobe of lung present.	Azygos lobe of lung present (Hyrtl).	Azygos lobe of lung absent.

Thus we may infer that the genera *Dasypus*, *Tolypeutes*, and *Xenurus* resemble one another more than any of them do *Tatusia*. *Chlamydomorphus*, in other respects so different from them all, is like *Dasypus* alone in its colic cæca, like *Dasypus*, *Tolypeutes*, and *Xenurus* in most respects, and like *Tatusia* only in the shape of its uterus.

2. Notes on a Specimen of *Polyborus* lately living in the Society's Gardens. By J. H. GURNEY, F.Z.S.

[Received Jan. 17, 1878.]

The Society's 'Proceedings' for 1876 contain at p. 333 a plate and a concise notice of two remarkable *Polybori* which were said to have been obtained in Patagonia, and which were placed in the Gardens on the 2nd of March of that year.

On the 27th of May, 1877, one of these birds unfortunately died ; and on examining the skin of this specimen, which proved on dissection to be a male, I have noticed the following points.

The wing measures 15·6 inches ; but the ends of the primaries are worn considerably, and except for this the measurement would, I think, have exceeded 16 inches ; the length of the tarsus is 3·7, and that of the middle toe *s. u.* 2·3 inches.

I have had the opportunity of comparing these measurements with those of four specimens of *Polyborus tharus* which have been kindly lent to me by Messrs. Salvin & Godman, and with those of two specimens in the Norwich Museum ; also with the measurements given by Mr. Sharpe, at p. 32 of the first volume of his Catalogue, of two others in the British Museum.

Unfortunately in none of these eight examples is the sex recorded ; but the result appears to prove that *Polyborus tharus* is subject to considerable variation of size, which further investigation may show to be incident, in part, to the different localities from which the specimens have been obtained.

The following are the measurements alluded to :—

In the collection of Messrs. Salvin & Godman.		Wing.	Tarsus.	Middle toe <i>s. u.</i>
Bahia		14·8	3·0	1·9
„		15·1	3·5	2·2
„		15·6	3·5	2·1
Supposed to be from Bolivia		16·0	3·5	2·2
In the Norwich Museum.				
Locality unknown		17·2	3·7	2·3
„		17·4	3·9	2·1
In the British Museum, as given by Mr. Sharpe.				
Locality not quoted		15·5	3·8	
„		17·9	3·8	

It will be seen from the above measurements that there is nothing in the dimensions of the specimen which died at the Gardens to show that it is not an abnormal example of *P. tharus* ; and although the extraordinary paleness of the ground-colour of its plumage presents a curious difference from the coloration of the same portions of the plumage in *P. tharus*, the form and disposition of the markings in great measure agree with those of that species in its immature stage.

The following notes refer to the details in which the pale specimen agrees with the ordinary *P. tharus* in its immature stage :—The upper part of the head, including the occipital crest, is decidedly darker than the adjacent plumage ; the ear-coverts are whole-coloured and of a castaneous tint ; the feathers of the throat and upper breast have strongly marked longitudinal shaft-marks ; and similar shaft-marks, but narrower and fainter, are perceptible on the lower breast

and on the interscapular feathers. All these shaft-marks resemble greatly in shape those on the corresponding portions of the plumage in the normal immature *P. tharus*; but in the latter the shaft-marks are paler than the sides of the feathers, while in the pale Patagonian specimen they are darker and more rufous. In the last-named bird faint transverse marks of a similar rufescent tint, but very pale, are perceptible on the abdomen and under tail-coverts; similar transverse marks, but darker, less rufous and more numerous, are apparent in a specimen of *P. tharus* in Messrs. Salvin & Godman's collection, marked "Bolivia?," which seems to me to be passing from the immature to the adult stage. Transverse bars alternately dark and pale and of a similar character are found on the lower part of the back in *Polyborus tharus* in all its stages; and these markings, though modified in their coloration, especially by the substitution of dull fulvous bars for those of blackish brown in ordinary specimens, are unmistakably present in the pale specimen under consideration.

The latter bird was moulting its primaries when it died; and I observe that the transverse bars on the new quill-feathers are broader than on the old, the latter agreeing in general character with the corresponding bars in immature specimens of the normal *P. tharus*, and the former with the same bars in adult birds. These bars are much more rufous, especially on the newly acquired feathers, than is the case in normal specimens; in the latter they are of various shades of brown, but not tinged with rufous.

The narrow transverse bars on the upper surface of the tail are less distinct in the Patagonian pale bird than in ordinary specimens of *P. tharus*; but they are similar in character and of about the same number (from 15 to 16). The broad terminal blackish-brown band at the end of the tail in the ordinary bird is represented in the pale one by a dull fawn-coloured band of similar dimensions tinged with rufous on its upper edge and on the external webs of the outer pair of rectrices¹.

During a recent visit to the Zoological Society's Gardens, I observed that the bare skin on the face of the survivor of the two pale birds, changed rapidly from carmine-red to pale pink; but Mr. Bartlett informed me that in neither of the pale specimens did these occasional and transient changes assume a wider range, and that in them the bare skin never became yellow, as may be sometimes seen to be the case (even to the extent of a decided lemon-colour) in the normal specimens of *Polyborus tharus* inhabiting the adjacent cages.

On the whole, I incline to agree with the opinion expressed by Mr. Selater in his original notice of this curious pair of birds, that they are "young individuals of *P. tharus* in an abnormal phase of plumage," or, as I would rather say, of colouring generally.

¹ The tail in the pale birds was imperfect when they were drawn for the plate in the Proc. Zool. Soc.; but the specimen under consideration obtained its full tail subsequently.

3. A Study of the Pteroclidæ or Family of the Sand-Grouse.
By D. G. ELLIOT, F.R.S.E. &c.

[Received January 18, 1878.]

The materials for the present paper were supplied by the splendid collection in the Paris Museum, kindly placed at my disposal by Prof. A. Milne-Edwards, who afforded me every facility for investigating this interesting group of birds, and to whom, as well as to Dr. E. Oustalet, Aide-Naturaliste, I desire to express my thanks. With the exception of *P. decoratus*, the type of which is, I believe, unique, every known species of the Pteroclidæ is represented in that Museum, many of them by series of both sexes in different plumages; and certain specimens are the types of the older writers. In the treatment of my subject I have followed the same method as that adopted for my "Review of the Ibinæ"¹, and give first the Literature of the Family, then the Classification, followed by some remarks upon the different genera proposed for the group; these are succeeded by a review of the Geographical Distribution; and I conclude with the synonymy and description of each species.

LITERATURE OF THE FAMILY.

Linnaeus is the first author to claim our attention.

1766. LINNÆUS, 'Systema Naturæ.'

In the list of species comprised in the genus *Tetrao*, this author places among those characterized by "*pedibus nudis*" a single species belonging to the Pteroclidæ, called by him *Tetrao alchata*. Species 1.

1771. LINNÆUS, 'Mantissa.'

In this work the *P. senegalus* is described as *Tetrao senegalus*. Species 2.

1773. PALLAS, 'Reise durch Verschied. Provinz. Russisch. Reichs.'
Syrnhaptes paradoxus is described as *Tetrao paradoxus*. Species 3.

1774. PALLAS, 'Nov. Comm. Petropol.'

Pterocles arenarius first made known as *Tetrao arenarius*. Species 4.

1786. SCOPOLI, 'Deliciæ Faunæ et Floræ Insubricæ.'

Pterocles fasciatus first described as *Tringa fasciatus*. Species 5.

1788. GMELIN, 'Systema Naturæ.'

Five species of this family are given by this author, all placed in Linnaeus's genus *Tetrao*, viz. *T. alchata*, Linn., *T. namaqua*, described for the first time, *T. indicus* (= *T. fasciata*, Scop.), *T. arenarius*, Pall., and *T. paradoxus*, Pall. Species 6.

¹ P. Z. S. 1877, p. 477.

1815. TEMMINCK, 'Histoire Naturelle Générale des Pigeons et Gallinacés.'

A general review of the Pteroclidæ is here given, as known to the author, with some species renamed that were previously described. They are as follows:—*P. arenarius*, Pall., *P. bicinctus*, *P. quadricinctus*, both described for the first time, *P. setarius* (= *T. alchata*, Linn.), *P. tachypetes* (= *T. namaqua*, Gmel.), and *Syrrhaptes pallasii* (= *T. paradoxa*, Pallas). Species 8.

1817. VIEILLOT, 'Nouveau Dictionnaire d'Histoire Naturelle.'

In his genus *Enas* are here included such species of this family as were known to the author, viz. *Æ. cata* (= *T. alchata*, Linn.), *Æ. bicincta*, *Æ. indica* (= *T. fasciata*, Scop.), *Æ. namaqua*, and *Æ. arenaria*. No new species are described.

1822. BURCHELL, 'Travels in South Africa.'

Pterocles variegatus first described. Species 9.

1823. LICHTENSTEIN, 'Verzeichniss der Doubletten des zool. Museum zu Berlin.'

Pterocles coronatus first described. Species 10.

1825. TEMMINCK, 'Planches Coloriées.'

Pterocles exustus and *P. lichtensteini* first described and figured. In an earlier portion of the work, in the 9th livraison (1823), *P. arenarius* is figured ♂ and ♀; and in the 57th livraison (1825) a representation of both sexes of *P. coronatus* is given. Species 12.

1837. SWAINSON, 'Birds of West Africa.'

Pterocles quadricinctus, Temm., renamed *P. tricinctus*.

1843. GOULD, in the 'Voyage of the Sulphur, Birds.'

Pterocles personatus described. Species 13.

1849. SMITH, 'Illustrations of South-African Zoology.'

Pterocles gutturalis described. Species 14.

1850. GOULD, in 'Proceedings of the Zoological Society of London.'

Syrrhaptes thibetanus described. Species 15.

1856. BONAPARTE, in 'Comptes Rendus.'

In his Table des Galinacés, Bonaparte proposes the genus *Pteroclurus* for certain species of this family, of which the *T. alchata*, Linn., may be considered as the type.

1870. CABANIS, in 'Von der Decken's Reise.'

Pterocles decoratus described. Species 16.

CLASSIFICATION.

The natural position of the Pteroclidæ (called by Prof. Huxley Pteroclomorphæ), in the Class Aves, is between the Columbidae (Peristeromorphæ) on the one hand, and the Tetraonine series of the

Gallinaceous birds (Alectoromorphæ) on the other, supplying the link which connects these two great divisions, and with them constitutes the Gallo-Columbine series. The Pteroclidæ resemble the Alectoromorphæ in their skull, palatines, maxillo-palatines, and bill; but the pterygoid and basipterygoid processes, sternum, furcula, coracoid, and fore limb are like those of the Pigeon. The foot, with its almost absent hallux (entirely wanting in *Syrrhaptēs*), and the short tarso-metatarsus are, however, very unlike a Pigeon's. The vocal organs, as shown by Mr. Parker¹, are the same as a Pigeon's; the trachea is cartilaginous, and possesses a pair of laryngeal muscles at its bifurcation; but the crop, gizzard, gall-bladder, and small intestines are like those of Gallinaceous birds. The cæca coli are very voluminous, but have twelve continuous longitudinal folds in their mucous membrane, instead of seven as in *Lagopus*. The proventricular glands, however, are Pigeon-like. The pterylosis of the Sand-Grouse, although very similar to that of a Pigeon, differs somewhat on its dorsal surface. The lateral neck-spaces are shorter, only reaching to the beginning of the neck; the superior wing-space is absent; the lumbar tracts coalesce with the posterior part of the dorsal tract, which latter also joins the plumage of the tibia. In some species the narrow spinal tract is wanting. The Pteroclidæ also differ from the Pigeons in possessing an after-shaft on the contour feathers, and from the Gallinaceous birds in having a naked oil-gland.

From the above it will be clearly seen how intermediate these singular birds are of the two great groups between which they are placed. In some of their characters they are also pluvialine, and their flight is especially Plover-like; but in their method of drinking they resemble the Pigeons, as the bill is thrust up to the nostrils into the water, and retained there until the bird's thirst is allayed. The members of the two genera adopted for this family closely resemble each other in their outward shape, being generally rather heavy of body, with long pointed wings and extremely short legs and toes, apparently quite disproportionate in size to the rest of the bird. The species, therefore, are awkward when on the ground, run clumsily, and appear to great disadvantage; but on the wing they move rapidly and gracefully. The bill, though small, is strong and Grouse-shaped; in *Pterocles* the tarsi are feathered in front; in *Syrrhaptēs* both tarsi and toes are completely covered with feathers, as in the winter coat of the Ptarmigan. I have arranged the members of *Pterocles* in two divisions, distinguished by the presence or absence of a conspicuous band across the breast. The first of these, without a pectoral band, contains five species, all but one having the breast of a uniform coloration.

The second division, with a pectoral band, possesses nine species, having, as a rule, a very different style of coloration from those in the other section of the genus. In the remaining genus *Syrrhaptēs*, but two species are as yet known, separated in their outward appearance from their relations in *Pterocles* by the feathered leg and foot

¹ Trans. Zool. Soc. vol. v. p. 204.

and the entire absence of a hind toe. One character by which *Syrrhaptes* was formerly distinguished was the extremely lengthened filamentous first primary observed in *S. paradoxus*; but since the discovery of the second species, which does not possess a similar formation, this peculiarity will not answer as a means of generic distinction. Both species of *Syrrhaptes* have the median rectrices much lengthened beyond the rest; but as this also occurs with several species of *Pterocles*, it cannot be regarded as of generic importance.

GENERA.

But few generic terms fortunately have been proposed for these birds. Usually placed by the older authors, who were misled by their feathered tarsi, in *Tetrao*, they were first separated from the Grouse by Temminck, who, in 1815¹, created for them the term *Pterocles*. In 1811 Illiger proposed *Syrrhaptes* for the *Tetrao paradoxa* of Pallas, separating it from the other species of the family. In 1812 Fischer instituted the term *Nematura* for the same bird, followed in 1816 by Vieillot with *Heteraclitus*, and also with *Ænas* for the other members of the family. Lastly Bonaparte, in 1856, created the term *Pteroclorus*. Two generic forms are evidently represented among the Pteroclidæ, for which the terms *Syrrhaptes*, of Illiger, to contain the two species *S. paradoxus* and *S. thibetanus*, and *Pterocles* of Temminck to include all the rest of the family, have the claim of priority, and are amply sufficient for the recognition of the generic divisions now existing. In the osteology of the two genera there are considerable differences observable, as has been well shown by Mr. Parker, some of which are the following:—The skull of *Syrrhaptes* is weaker, less gallinaceous, and more pigeon-like than that of *Pterocles*; the upper frontal region is narrower between the eyes, and the alæ of the ethmoid are less swollen between the crura of the nasal. In *Pterocles* the bones of the face are as strong as is observed in a Pigeon; the lower jaw is stronger than in *Syrrhaptes*, and bends further back; the postorbital and squamosal processes are stronger, as is also the malar arch; in some characters of the skull and skeleton they are nearly alike. *Pterocles* has the scapula more like that of a Grouse, and also possesses one more caudal vertebra than *Syrrhaptes*, and the styliform and sacral ribs have no appendage; but both genera have a rudiment attached to the last hæmapophysis. The sternum is stronger, with the episternum and hyosternal processes as in *Syrrhaptes*; but the external hyposternal processes are shorter.

Of fossil remains of Pteroclidæ but two tarso-metatarsal bones have been found, which have been described by Prof. A. Milne-Edwards, in his great work 'Les Oiseaux Fossiles,' as *Pterocles sepultus*. By the kindness of their possessor I have had an opportunity of examining

¹ In his 'Manuel d'Ornithologie' (1820), 2nd part, p. 474, in a footnote, Temminck states that he published an account of these birds under the generic name of *Pterocles* in 1809. I have not been able to find this publication, nor any record of it, and 1815 is the earliest date I can assign to the genus.

these interesting specimens. There is a slight difference observable in their size, one being rather stouter than the other; and they evidently belong to two individuals, perhaps different sexes of the same species; and, as stated by Monsieur A. Milne-Edwards¹, represent a species between the *P. alchata*, Linn., and the *P. gutturalis*, Smith.

The following are the genera proposed for these birds, with the type of each added:—

	Type.
(1811) <i>Syrrhaptes</i> , Illiger, Prodr. p. 243	<i>Tetrao paradoxus</i> , Pall.
(1812) <i>Nematura</i> , Fisch. Mém. Soc. Natur. Moscou	<i>Tetrao paradoxus</i> , Pall.
(1815) <i>Pterocles</i> , Temm. Man. Ornith. p. 299.....	<i>Tetrao alchata</i> , Linn.
(1816) <i>Œnas</i> , Vieillot, Analyse, p. 52	<i>Tetrao alchata</i> , Linn.
(1816) <i>Heteractitis</i> , Vieillot, Analyse, p. 53	<i>Tetrao paradoxus</i> , Pall.
(1856) <i>Pteroclorus</i> , Bon. Compt. Rend. xlii. p. 880	<i>Tetrao alchata</i> , Linn.

GEOGRAPHICAL DISTRIBUTION.

The Pteroclidæ have been found in only three of the zoogeographical divisions of the earth's surface, viz. the Palæarctic, Oriental, and Ethiopian regions; and in these they are chiefly restricted to tracts devoid of cultivation, or actual deserts. From the fact that of the sixteen known species twelve are met with in the Ethiopian region, we may safely regard the Pteroclidæ as having originated in Africa, from which they spread into the other two regions named above. Of the twelve Ethiopian species, seven (or a little over half) are not found in the other zoogeographical divisions. In the Oriental region, which is the next richest in the birds of this family, seven species are found, one of which is peculiar to it; and, lastly, the Palæarctic region is tenanted by five species, two of which, constituting the genus *Syrrhaptes*, are not found elsewhere. Commencing with the Ethiopian region, where the species appear confined mainly to the eastern side of the continent, we find the *Pt. gutturalis* extending its range from Abyssinia to Kurrichane, just north of the Cape Colony, where it was procured by Sir A. Smith. In Egypt and Nubia *Pt. coronatus* is found, not going south of the last-named country on this coast. It is also met with in the southern part of the desert of Sahara, and again on the plains of the Sinaitic peninsula, and probably occurs throughout Arabia, as, together with the three species next mentioned, it is found in Sindh of the Oriental region. In the region extending from and including Egypt to the Somali country *Pt. exustus*, *Pt. senegalus*, and *Pt. lichtensteini* are found; while *Pt. quadricinctus* appears to be restricted to Abyssinia and Sennaar, although given by Swainson as a bird of West Africa under the name of *Pt. tricinatus*. Passing southwards along the same coast, we find *Pt. variegatus*, *Pt. namaqua*, and *Pt. bicinctus* inhabiting the Trans-Vaal, whence they range across this part of the continent into Damaraland. Somewhere in the interior of Eastern Africa *Pt. decoratus* dwells, according to Cabanis; but its precise distribution does not appear

¹ Oiseaux Fossiles, tom. ii. p. 295, pl. 141. figs. 1-9.

to be exactly known. The type and only known specimen was obtained near Lake Jipe. It is most probable that the range of some of the species mentioned above may be much greater; but before this can be definitely determined our knowledge of the interior of the continent and its avi-fauna must be greatly increased. *Pt. exustus* is given by Hartlaub, in his 'System der Ornith. West-Afrika's,' upon the authority of a specimen in the Berlin Museum, as an inhabitant of Senegal. I have not seen this corroborated by any other writer; and the species seems to be more particularly a bird of East Africa, although it is not unlikely that it may skirt the southern border of the Sahara quite across the continent. Finally, according to Tristram, *Pt. arenarius* is found everywhere in the Sahara, except in the extreme south. In the Oriental region, the next in order, we find that in Sindh, with the exception of *Pt. decoratus* and *Pt. quadricinctus*, all of those species already mentioned as dwelling in the Ethiopian region are met with, two of which (*Pt. coronatus* and *Pt. lichtensteini*) do not seem to be found in any other part of India. *Pt. senegalus* is met with along the shores of the Runn of Cutch and in Northern Guzerat; while *Pt. arenarius* goes north into the Punjaub and thence through the North-west Provinces; and *Pt. alchata* occurs in the Peshawur valley. *Pt. exustus* and *Pt. fasciatus* are distributed generally throughout India, the last-named species not being found in Sindh.

The last zoogeographical region in which these birds occur is the Palæarctic; and commencing in the far east we have the members of the genus *Syrnhaptēs*; of which *S. paradoxus* ranges from the plains of Pekin and Tientsin, through Mongolia and the Great Gobi desert into the Kirghis steppes, occasionally wandering into parts of Western Europe in more or less extensive numbers. The year 1863 was a notable one for a great migration of this species, flocks of considerable size having been observed as far west as Ireland. The only other known species, *S. tibetanus*, is distributed from the Kokonor basin on the east, through Northern Thibet to Ladakh. In this region also, *Pt. senegalus* is a native of Palestine, where, according to Tristram, it is numerous. *Pt. arenarius* is common throughout Turkestan, and is not rare in the eastern steppes of New Russia and the Caucasus. It is also met with in Persia and about Erzerum, not uncommon in Palestine, and is distributed generally throughout south-western Europe, being common in Spain and Portugal. It is also a dweller of the Algerian deserts, whence it extends into the Ethiopian region as already enumerated, and has also been obtained in Greece. Its most western locality that I have seen recorded is the Canary Islands, where it has been observed in the Gran Canaria. The only remaining species to be noticed in the Palæarctic region is *Pt. alchata*, which ranges from the Kirghis steppes into southern Russia; it is common in Asia Minor and Palestine, and occurring throughout Southern Europe, is found in France where *Pt. arenarius* is not known. It is also common in Spain, and frequently met with in Portugal, and is abundant in the Algerian deserts. It has been

obtained at Malta, and also in Greece, where, according to Von der Mühle, a specimen has been procured in Eubœa.

Genus PTEROCLES.

Body rather long and heavy; bill rather stout; culmen curved; groups ascending; sides of mandibles compressed. Nostrils basal, open, oblong, partly covered by a membrane; frontal feathers projecting over, but not intruding upon, the nasal aperture. Wings long, pointed; first primary longest. Tail cuneate; median rectrices sometimes lengthened beyond the rest. Tarsi short, covered anteriorly with downy feathers; feet small, bare, the hallux extremely short, almost obsolete, not reaching the ground.

Key to the Species.

- A. Without pectoral band.
 - a. Front and chin black 1. *Pt. personatus*.
 - b. Loral space black; throat yellowish, bordered on its lower edge with a band of black; breast greenish-grey; abdomen chestnut 2. *Pt. gutturalis*.
 - c. Stripe on each side of forehead, from nostril to above the eye, chin, and centre of throat black 3. *Pt. coronatus*.
 - d. Lores and band encircling back of head pearly-grey; cheeks, ear-coverts, and throat orange yellow; centre of abdomen black 4. *Pt. senegalus*.
 - e. Top of head yellowish-brown, streaked with black; throat pearly-grey; underparts rufous, spotted with white..... 5. *Pt. variegatus*.
- B. With pectoral band.
 - a. Without black bar on forehead.
 - a'. Median rectrices not lengthened much beyond the rest.
Upper part of throat and sides of neck rufous; lower portion of throat black; band on lower part of breast; abdomen and flank black 6. *Pt. arenarius*.
 - b'. Median rectrices greatly lengthened beyond the rest.
 - a''. Throat yellow; black band across breast; abdomen and flanks chestnut 7. *Pt. exustus*.
 - b''. Throat and stripe behind the eye black; sides of throat rufous; centre of breast chestnut, bordered above and below with black; rest of underparts white 8. *Pt. alchata*.
 - c''. Throat orange-yellow; breast crossed by a white and a chestnut band; abdomen rufous brown 9. *Pt. namaqua*.
 - b. With black bar across forehead.
 - a'. Breast uniform greenish buff.
 - a''. Lower part of breast bordered with a chestnut band, succeeded by a white one; rest of underparts yellowish-white, barred narrowly with black; wing-coverts with two black bands, margined on the upper side only with white 10. *Pt. fasciatus*.

- b''*. Lower part of breast bordered with a rather broad white band, succeeded by a broad black one; rest of underparts yellowish-white, irregularly barred with black 11. *Pt. bicinctus*.
- c''*. Lower part of breast crossed by four bands, first a maroon one, succeeded by a white one, then a black, and lastly a white one, alternating; wing-coverts with only one black band, margined on both sides with white 12. *Pt. quadricinctus*.
- b'*. Throat pale buff; upper part of breast buff, crossed with numerous narrow black bars; middle of breast uniform buff, crossed in centre by a narrow black bar, and another of the same hue on its lower edge; rest of underparts yellowish-white, barred narrowly with black... 13. *Pt. lichtensteini*.
- c*. Black bar on forehead, divided in the centre by a white spot; throat and abdomen black; black bar crosses the breast, between which and the abdomen is a broad white band 14. *Pt. decoratus*.

1. PTEROCLES PERSONATUS.

Pterocles personatus, Gould, Voy. 'Sulphur,' Zool. pl. 30 (1843); id. P. Z. S. (1843), p. 15; Gray, Gen. B. vol. iii. p. 519 (1845); Reich. Syn. Av. Gallinæ (1851), pl. ccviii. figs. 1821, 1822.

Hab. Madagascar.

This is one of the largest species of the genus, readily recognized from its relatives by the entirely black forehead and chin. M. Grandidier informs me that it is very abundant in Madagascar, where he has shot many, and that its flesh is palatable. In its economy and habits it does not differ from the other members of the genus.

Male. Forehead and chin jet black. Lower part of throat and sides of face buffy-white. Top of head, occiput, upper part of back and breast dark isabelline or vinous. Middle of back dark brown, greyish tinge on some feathers; rest of back, rump, and upper tail-coverts black, barred narrowly with light buff. Wings uniform, like the breast; a few of the greater coverts tipped with brownish black, forming three irregular bars upon the wing. Inner secondaries dark grey, tipped with vinous. Primaries dark chocolate-brown, with light edges on the inner webs. Abdomen, flanks, and vent barred narrowly with black and rufous; the feathers nearest the breast barred with black and buffy white. Under tail-coverts light chestnut. Tail brownish black, barred with white (these broadest and most numerous on the outer webs), the feathers largely tipped with white. Bill apparently bluish, with dark tips. Feet black.

Total length $13\frac{3}{4}$ inches; wing $9\frac{3}{4}$, tail 5, bill along gape $\frac{3}{4}$.

Female. Throat and sides of face buffy white; breast vinous. Entire upper parts and wings pale buff, barred irregularly with black. Primaries dark brown, with light edges and tips. Flanks and

chest barred with white and black; abdomen and vent barred with rufous and black. Under tail-coverts ochraceous. Tail blackish brown, barred and largely tipped with yellowish white. Bill and feet blue-black.

Total length $11\frac{3}{4}$ inches; wing $8\frac{1}{2}$, tail $4\frac{1}{4}$, bill along gape $\frac{5}{8}$.

A young bird differs from the female in having the breast vinous in the centre, pale buff on the sides, each feather with two narrow brown bars. Abdomen, flanks, and vent chestnut, barred sparingly with black. Wings very pale buff, barred with black. Rest of plumage as in the female.

2. PTEROCLES GUTTURALIS.

Pterocles gutturalis, Smith, Ill. S.-Afr. Zool. (Birds), pl. 3 ♂, pl. 31 ♀ (1849); Gray, Gen. B. vol. iii. p. 519 (1849); Reich. Syn. Av. Gallinæ (1851) pl. cex. figs. 1829, 1830; von Heugl. Syst. Uber. Vög. N.O.-Afr. (1855) p. 304; Parker, Proc. Zool. Soc. (1862) p. 258; id. Journ. für Ornith. (1862) p. 286; Layard, Birds S. Afr. (1867) p. 278; id. Ibis (1868) p. 269; Ayres, Ibis (1869) p. 297; Blanford. Geol. & Zool. Abyss. (1870) p. 421; Von Heugl. Ornith. Nordost-Afr. Band ii. (1873) p. 862; Buckley, Ibis (1874) p. 385.

Hab. Kurrichaine, South Africa (*Smith*); Trans-Vaal (*Ayres*, *Buckley*); Adoa and Axum to Shoa, Abyssinia (*Heuglin*); Agula, Antalo, Abyssinia (*Blanford*).

This fine species of Sand-Grouse was first described by Sir A. Smith (*l. c.*), who obtained it about eighty miles to the eastward of Latakoo, his attention having been drawn to the bird by its cry, which was very different from that of *P. namaqua*, and resembled the syllables *tweet-tweet*. Like all the other species they resorted to the water in large flocks, but when feeding were dispersed and observed only singly or in pairs. Grass-seeds and abundance of gravel were found in the stomachs of the individuals that were killed. The eggs, which are two or three in number, are laid upon the bare ground; and the young take to a wandering life almost immediately after they are hatched.

In Abyssinia Mr. Blanford considers this species to be local, as he only saw it in two or three places in the highlands, at Agula and Antalo; and Rüppell mentions it only at Shoa, though Von Heuglin procured it near Adowa.

Mr. Ayres states that in the neighbourhood of Potchefstroom, in the territory of the Transvaal, this species is abundant towards the end of winter and beginning of spring. Their flight is strong, resembling that of Pigeons; and when alarmed, they do not run, but lie close to the ground, from which they take wing at once. Their notes, uttered only on the wing, are harsh, and may be heard at a considerable distance. They feed upon a species of tare or pea, and upon bulbous roots of a species of grass; from the aromatic properties of these last the birds, after feeding freely upon them, are thoroughly scented. Iris is dusky-brown. The egg is " $1\frac{1}{16}$ in. by $\frac{13}{16}$ in.; the ground-colour is dusky-tawny, marked with lines and

blotches of umber, especially towards the base of the egg, where these marks form an encircling zone."

Male. Black stripe from nostrils to the eye; sides of head, neck, and throat pale buff; a black line encircles the lower part of the throat, and extends onto the back of the neck, where it is broadest. Top of head dark brown; back of neck pale greenish yellow. Breast dark greyish buff, with a wash of green. Entire rest of underparts chestnut. Back and inner secondaries greenish grey. Wing-coverts brownish grey, the greater ones tipped with ochraceous. Primaries dark brown, with pale edges. Median rectrices greenish grey; lateral ones black, tinged with ochraceous on edge of outer web, and tipped with light rufous. Under tail-coverts bright chestnut. Iris deep brown. Bill and feet black.

Total length $11\frac{3}{4}$ inches; wing 9, tail $4\frac{3}{8}$, bill along gape $\frac{3}{4}$.

Female. Top of head black; feathers margined with light buff. Back of neck buff, with a central streak of black. Feathers of back, wings, and breast black, with a large buff spot on each web at the tip, those on lower part of back and wings being rather circular in form, giving those parts a spotted appearance, while the breast and upper part of back seem to be streaked with broad black lines on a buff ground. Secondaries black, scalloped on the edges, and tipped with light buff. Primaries blackish brown. Flanks, abdomen, thighs, and vent deep rufous, narrowly barred with black. Tail black, barred with deep buff along the margins of the webs, and tipped with reddish buff. Upper tail-coverts like the back; under coverts deep chestnut, barred on their basal half with black. Bill and feet black.

Total length 11 inches, wing 9, tail 4, bill along gape $\frac{3}{4}$.

3. PTEROCLES CORONATUS.

Pterocles coronatus, Licht. Verz. d. Doubl. (1823) p. 65; Temm. Planch. Color. (1825) nos. 339, 340; Rüpp. Neue Wirbelth. (1823-1835) p. 114; Wagl. Syst. Av. (1827) *Pterocles*, sp. 4; Gray, Gen. B. vol. iii. p. 519 (1849); Reich. Syn. Av. Gallinæ, pl. ccviii. figs. 1815, 1816 (1851); Heugl. Syst. Über. N.O.-Afr. (1855) p. 304; Tristr. Ibis (1860) p. 71; Von Heugl. Journ. für Ornith. (1862) p. 415; Hartm. Journ. für Ornith. (1863) pp. 303, 307; Adams, Ibis (1864) p. 27; Allen, Ibis (1864) p. 240; Wyatt, Ibis (1870) pp. 9, 16; Shelley, Ibis (1871) p. 144; id. B. Egypt (1872) p. 221; Hume, Str. Feath. (1873) vol. i. p. 224; Von Heugl. Ornith. Nordost-Afr. (1873) Band ii. p. 863; Wise, Str. Feath. (1876) vol. iv. p. 230.

Hab. Rare in Egypt and Nubia (*Shelley*); southern parts of the Sahara (*Tristram*); El Kab, Egypt (*Allen*); Nubia and Kordofan (*Heuglin*); Nubia and Arabia (*Rüppell*); Plain of El Goa, Sinai (*Wyatt*); Jacobabad, N.W. Sindh (*Hume*); Kurrachee district (*Wise*).

According to *Tristram* this Sand-Grouse is confined to the more southern portions of the Sahara, where it supplants *P. arenarius*. He only met with it in parties of four or five; and the egg was of an

ashy white with a few almost obliterated pale-brown markings. In Egypt Capt. Shelley found this species to be rare, and also in Nubia; and he does not think it goes into the Delta. Dr. Adams met with it at the Second Cataract; and when at El Kab, Mr. Allen killed a pair out of a flock that came down to drink at a pool. Their cry was hoarser than that of the common species (*P. exustus?*),

Male. A line on each side of the forehead, from the nostril to above the eye, chin, and a narrow line down the centre of the throat jet black. A pearly grey band on each side of the occiput, meeting at the back of the neck. Centre of forehead white. Top of head vinous. Sides of neck, throat, and lower part of neck behind orange. Upper parts and wings vinous, with the tips of the wing-coverts pale buff, surrounded by a dark grey margin on the inner side. Primaries dark brown, with the tips of the 5th to 9th buffy-white; shafts of first two pure white, of the rest brownish white. Entire underparts pale sandy-buff, darkest on the middle of abdomen and vent. Median rectrices not extending beyond the rest, vinous. Lateral feathers pale rufous, with a subterminal bar of black, and white tips. Bill bluish. Feet dark brown.

Total length 10 inches; wing $7\frac{1}{2}$, tail $3\frac{1}{2}$, bill along gape $\frac{5}{8}$.

Female. Throat and sides of the neck orange, palest on the chin. Entire upper parts sandy buff with a vinous tinge, barred narrowly with black. Wings paler buff, irregularly barred with fine black lines, broadest and most conspicuous on the scapulars and some of the inner secondaries. Breast and underparts very pale buff, almost white upon the flanks, each feather margined with pale brown. Under tail-coverts yellowish white. Tail vinous, with a subterminal black bar, and white tip.

Total length 10 inches, wing $7\frac{3}{4}$, tail $3\frac{1}{2}$, bill along gape $\frac{5}{8}$.

4. PTEROCLES SENEGALUS.

Tetrao senegalus, Linn. Mantissa (1771) p. 526; Lath. Ind. Orn. vol. ii. p. 642.

La Gélinothe de Sénégal, Buff. Planch. Enlum. p. 130.

Pin-tailed Grouse, var. A, Lath. Gen. Syn. (1783) p. 748.

Senegal Grouse, Lath. Gen. Hist. B. vol. viii. (1823) p. 253.

Pterocles guttatus, Licht. Verz. d. Doubl. (1823) p. 64; Rüpp. Neue Wirbelth. (1823–1835) p. 114; Wagl. Syst. Av. (1827), *Pterocles*, sp. 8; Less. Trait. Ornith. (1831) p. 517. sp. 8; Allen, Ibis (1864) p. 240; Gould, B. Asia, pt. iii. pl. 6; Hume, Ibis (1872) p. 468; Von Heugl. Ornith. Nordost-Afr. Band ii. (1873) p. 860.

Pterocles senegalensis, Shaw, Nat. Misc. vol. iv. pl. 933; Taylor, Ibis (1859) p. 50, (1867) p. 67; Heugl. Syst. Uebers. Vög. Nordost-Afr. (1855) p. 304; Speke, Ibis (1860) p. 247; Tristr. Ibis (1868) p. 211; Taczanow. Journ. für Ornith. (1870) p. 51; Shelley, Ibis (1871) p. 144.

Pterocles senegalus, Gray, Gen. B. vol. iii. p. 519 (1845); Tristr. Ibis (1860) p. 71.

Pteroclorus senegalus, Bon. Compt. Rend. (1856) vol. xlii. p. 880; Reich. Syn. Av. Gallinæ (1851) pl. ccx. figs. 1831, 1832.

Pterocles senegalus, Shelley, B. Egypt (1872) p. 220; Hume, Str. Feath. (1873) vol. i. p. 221; James, Str. Feath. vol. iii. (1875) p. 418; Butler, Str. Feath. (1875) vol. iii. p. 4, (1877) vol. v. p. 231.

Fukee, Somali (Speke).

Hab. Egypt (*Shelley*); extreme south of the Sahara (*Tristram*); Somali country, East Africa (*Speke*); Egypt and Nubia (*Rüppell*); Palestine (*Tristram*); Sindh, Northern Guzerat, along the shores of the Runn of Cutch (*Hume*).

Canon Tristram states that this species is confined to the extreme south of the Sahara, but is more plentiful there than *P. coronatus*. He obtained one nest; and the egg had a ground-colour similar to that of *P. alchata*, but was scarcely more than half the size, and had very faint brown spots.

In the Somali country Capt. Speke met with this Sand-Grouse on the plateau in large flocks. In Sindh Mr. Hume found this species in certain localities to be very numerous. Their habits are very much like those of other Sand-Grouse, keeping together in parties of from fifty to sixty; and very often in winter a flock consists of one sex only. They trot about on the dry soil, picking up seeds and insects, or squat and enjoy the warmth of the morning sun. They seemed to be less pugnacious than some of the other species, as, although he watched them closely, he did not observe the perpetual skirmishing among the males, such as he had noticed took place with those of *P. arenarius* in the Punjaub. It is probable that this species breeds in Sindh.

Male. General plumage sandy buff. Lores and a band encircling the back of the head pearly grey. Underparts sandy-buff, washed with grey on the breast. Middle of abdomen black. Basal portion of scapulars, greater wing-coverts, and secondaries dark brown, tips buff. Primaries pale buff, graduating into brownish black towards the tips, which are buff. Central rectrices lengthened beyond the rest, pale buff, apical half black; lateral ones greyish brown, with a subterminal black band and white tips. Bill and feet lead-colour.

Total length $12\frac{1}{2}$ inches, wing $7\frac{1}{2}$, tail $\frac{5}{8}$, bill along gape $\frac{5}{8}$.

Female. Throat and sides of neck orange, lighter on the chin. Entire upper parts and wings sandy-buff, covered with black spots. Primaries sandy-buff, graduating into dark brown near the ends, and tipped with pale buff. Underparts bright buff, spotted on the breast with dark brown. Centre of abdomen black. Upper tail-coverts like the back. Median rectrices buff, faintly barred with black, their elongated tips brownish-black. Lateral feathers pale brown, lightest on the outer webs, with a subterminal brownish-black bar, and white tips. Bill dark horn-colour. Feet dark brown.

Total length $11\frac{1}{2}$ inches, wing 8, tail $4\frac{3}{4}$, bill at gape $\frac{1}{2}$.

5. PTEROCLES VARIEGATUS.

Pterocles variegatus, Burch. Trav. S. Afr. vol. ii. p. 345 (1822); Gray, Gen. B. vol. iii. p. 519 (1849); Reich. Syn. Av. Gallinæ

(1851) pl. cex. figs. 1833, 1834; Strickl. & Sclat. Contr. Ornith. (1852) p. 157; Lay. B. S. Afr. (1867) p. 279; id. Ibis (1868) p. 269, (1869) p. 375; Ayres, Ibis (1871) p. 262; Anderss. B. Dam.-l. (1872) p. 242.

Pterocles maculosus, Smith, Ill. S.-Afr. Zool. vol. ii. p. 345 (1822); Gray, Gen. B. vol. iii. p. 519 (1845).

Hab. Between Latakoo and the Tropics, South Africa (*Smith*); banks of the Limpopo and Mariqua (*Ayres*); Damaraland (*Andersson*).

Male. Throat and sides of face pearly-grey. Top of head and occiput deep buff streaked with black. Upper parts and wings brownish-black, tipped with yellowish-ochre, and spotted with white; the tips of the greater coverts, however, are reddish-ochre. Primaries brownish black, with light edges. Breast and entire underparts bright rufous, each feather with a subterminal white bar. Tail brownish-black, barred with light buff, and tipped with yellowish ochre. Bill black, feet yellowish-brown.

Total length $9\frac{1}{2}$ inches, wing $6\frac{3}{4}$, tail $3\frac{1}{2}$, bill along gape $\frac{1}{2}$.

Female. Top of head bright buff, streaked with dark brown. Sides of head and throat bright uniform buff. Feathers of the back and wings blackish-brown, tipped with light yellowish-brown, and with two or three white bars on the webs, which do not, however, reach the shaft, and give to the back the appearance of being spotted with white. Primaries blackish-brown, edged at the tip with white. Breast reddish-buff, indistinctly barred with white. Underparts dull white, barred with pale brown. Upper tail-coverts like the back. Tail brownish-black, barred and tipped with light buff. Under tail-coverts uniform light buff. Bill black; feet yellowish-brown.

Total length $9\frac{3}{8}$ inches, wing $6\frac{3}{4}$, tail $3\frac{1}{2}$, bill along gape $\frac{1}{2}$.

6. PTEROCLES ARENARIUS.

Tetrao arenaria, Pall. Nov. Comm. Petropol. vol. xix. p. 418, tab. 8 (1774); id. Itiner. vol. iii. App. p. 699, no. 271; id. Zoogr. Rosso-Asiat. vol. ii. p. 73, pl. (1831); Lath. Ind. Orn. vol. ii. p. 642 (1790); Bonnat. Ency. Méth. tom. i. p. 200 (1790).

Sand-Grouse, Lath. Syn. vol. ii. pt. 2. p. 751 (1783); id. Gen. Hist. B. vol. viii. (1823), p. 254.

Tetrao fasciatus, Desfont. Mém. de l'Acad. des Sc. p. 502 (1787).

Aragonian Partridge, Lath. Syn. Suppl. p. 223 (1787).

Perdix aragonica, Lath. Ind. Orn. p. 645 (1790); id. Gen. Hist. B. vol. viii. (1823) p. 256 B.

Pterocles arenarius, Temm. Pig. et Gallin. vol. iii. (1815) pp. 240, 712; id. Planch. Col. nos. 52, 53; id. Man. Ornith. (1820) vol. ii. p. 476, vol. iv. p. 330; Wagl. Syst. Av. (1827) *Pterocles*; Less. Trait. Ornith. (1831) p. 516, sp. 1; Fras. Proc. Zool. Soc. (1839) p. 121; Gray, Gen. B. vol. iii. p. 518 (1849); Blyth, Cat. B. Mus. Asiat. Soc. (1849) p. 249; Reich. Syn. Av. Gallinæ (1851) pl. cervii. figs. 1809-12; Adams, Proc. Zool. Soc. (1858) p. 501; Salv. Ibis (1859) p. 352; Tristr. Ibis (1860) p. 69, (1868) p. 211; Irby, Ibis (1861) p. 223; Jerd. B. Ind. vol. iii. p. 496;

Bree, B. Eur. vol. iii. p. 226, pl. (1862); Tristr. Proc. Zool. Soc. (1864) p. 449; Lilford, Ibis (1866) p. 379; Drake, Ibis (1867) p. 428; Smith, Ibis (1868) p. 450; Taczanow. Journ. für Ornith. (1870) p. 51; Saund. Ibis (1871) p. 223; Rey, Journ. für Ornith. (1872) p. 154; Godman, Ibis (1872) p. 219; Garrod, Proc. Zool. Soc. (1873) pp. 468, 639, (1874) p. 254; Hume, Str. Feath. vol. i. (1873) p. 219; Krüper, Journ. für Ornith. (1875) p. 282; James, Str. Feath. vol. iii. (1875) p. 418; Butler, Str. Feath. (1876) vol. iv. p. 4, (1877) vol. v. p. 231; Dresser, Ibis (1876) p. 322; Schallow, Journ. für Ornith. (1876) p. 186; Scully, Str. Feath. (1876) vol. iv. p. 179?; Danf. Ibis (1877) p. 273.

Tetrao subtridactyla, Hasselq. It. p. 250.

Tuturuk, *Boora-kurra*, in Afghanistan (Jerdon). *Bukt-titar*, *Bakht-tit*, *Buklit*, also *Ban-chur-Kurmoor*, at Peshawur (Jerdon). *El Koudhre*, Arabic (Tristram). *Corteza*, near Seville (Saunders). *Ortega Churra*, in Spain (Lilford). *Barrigra negra* in Portugal (Smith). *Beghitak*, Yarkand (Scully).

Hab. Desert regions of Asia, Southern Europe, and North Africa (*Blyth*); plains of Fuerteventura, Gran Canary (*Godman*); Harak-ta plains of the Eastern Atlas, Djendeli, Maderacen (*Salvin*); Sahara desert everywhere, except in the extreme south (*Tristram*); Erzeroum (*Dickson* and *Ross*); Asia Minor (*Danford*); Palestine (*Tristram*); very common in Jodhpoor, not uncommon in Sindh, fairly plentiful in eastern portions of Cutch, all along the eastern shores of the Rann, and in the north-eastern portions of Kattiawar (*Hume*); Punjab, N.W. Provinces, Bengal (*Adams*), Besharik, Yarkand, and Koshtak in Eastern Turkestan (*Scully*); Western Persia (*De Filippi*).

When in Yarkand Mr. Scully states (*l. c.*) that he heard of a bird called *Beghitak* by the natives, which lived in the desert ground, was yellowish brown in colour, and had feathered legs, and long pointed wings. Its blood was reputed a specific for consumption. Although he did not succeed in obtaining a specimen, yet once near Besharik he saw a pair at a distance, and the next day he saw three more, which appeared to be yellowish brown above, breast dove-colour, abdomen dark or black, and lower tail-coverts white. They were so wild and wary that he could not get a shot at them. Although he refers these birds to *P. arenarius*, it is more probable, as suggested by Mr. Hume, they were *Syrrhaptes paradoxus*.

Jerdon, in the 'Birds of India,' says that this Sand-Grouse is only found in the north-west provinces and Sindh, rarely extending so low as Allahabad, is tolerably abundant in the Punjab, and stated to be very abundant on the edges of the great desert. He had also heard of its having been killed near Nusserabad and in Khandeish. It arrives at the end of September, and leaves in March, and is therefore only a winter visitor in India. It frequents sandy plains, flies in vast flocks, and, like others of the family, it regularly visits twice a day certain drinking-places, and is fond of basking in the sun and rolling in the sand. The flight of this species is very strong and swift; and sometimes it traverses great distances. It is a very shy bird, difficult of approach, and much esteemed as an article of food.

In flocks it is stated that one or other sex greatly preponderates; sometimes seven females are obtained to one male, and *vice versâ*.

Canon Tristram states (*l. c.*) that this species is universally distributed throughout the Sahara, except in the extreme south, where it gives place to *P. senegalus*. It has so much of the Plover-character that he took the first covey that he saw for large Plovers. He did not find it so wary as *P. alchata*; but when approached closely it would suddenly rise to a great height and fly for a long distance. The species lays three eggs of a pale fawn-colour, with obsolete pale brown blotches; they are elliptical in shape, and are placed two in a line, and the third lengthwise outside, in a depression in the ground. He observed that when the hen was sitting one wing was spread out to cover the eggs; and she thus presented a grotesque lopsided appearance. The flesh, although extremely white, was very poor and dry, without any flavour. In support of this testimony Capt. Irby says, in his paper "On the Birds of Oudh and Kumaon," that this bird, obtained by him near Hurdue, was uneatable and tended to confirm what the natives say, "that they live upon sand."

Male. Top of head and occiput dark brownish grey, with a pearly tinge, becoming a lighter grey on loreal space, around the eye, and ear-coverts. Upper part of throat and sides of neck chestnut, becoming deep orange towards the back of the neck. Lower part of throat in front black. Breast pearly grey, crossed on the lower part by a rather broad black band, succeeded by another of rich buff, which is widest on the sides near the wings. Rest of underparts jet-black. Feathers of the back and wing-coverts are rich buff, each feather with a subterminal greyish-black bar, and tipped with orange-yellow. Secondaries deep buff, the terminal third of outer web bright orange; some of the inner ones with a subterminal greyish-black bar like the coverts, and some with this colour only along the shaft. Greater wing-coverts orange-yellow on their apical third. Primaries greyish black. Upper tail-coverts like the back; under coverts black, tipped with white. Rectrices pale rufous, crossed with narrow black bars, and tips white. Thighs black; tarsi covered in front with buffy white feathers. Bill bluish. Feet brownish. Iris brown. Total length $11\frac{3}{4}$ inches, wings $9\frac{1}{4}$, tail $4\frac{1}{4}$, bill along gape $\frac{5}{8}$.

Female. Top of head and occiput rufous, streaked with black. Upper part of throat and sides of head yellowish white, the feathers of the lores and ear-coverts with a fine central black streak; lower part of throat crossed by a blackish band. Breast rich buff, becoming buffy white near the abdomen, the feathers of the upper part, with a central streak and spot at the tip, black. A black band crosses the lower part, beneath which there are no spots. Rest of underparts black. Back and wings deep buff, crossed irregularly with narrow black lines; the greater coverts tipped with orange. Secondaries deep buff, barred narrowly with black, and all but the innermost ones with a broad band of deep orange on the outer webs at their tips. Primaries greyish black, edges whitish. Rectrices very

dark brown, crossed with narrow indistinct brownish-black lines, and tipped with buffy white. Under tail-coverts black, tipped with white. Thighs brownish black; tarsi covered in front with short buffy-white feathers. Bill brownish, with a black tip. Total length $11\frac{1}{2}$ inches, wing 9, tail $3\frac{3}{8}$, bill along gape $\frac{5}{8}$.

A young bird from Erzeroum has the head, back, wings, and breast light buff, with a central line and one or more bars on each feather black, some crossing in a direct line, some in the shape of arrow-heads. Primaries greyish black, with buffy-white tips. Abdomen and flanks black. Middle rectrices light buff, crossed with numerous narrow curved black bars; the lateral ones greyish black along the shafts, buff on the outer margin, barred with black and tipped with white, this last increasing in extent as it goes towards the external feather. Under tail-coverts brownish black, and tipped with white.

7. *PTEROCLES EXUSTUS*.

Bahtah Grouse, Lath. Gen. Hist. Birds, vol. viii. (1823) p. 258.

Pterocles senegalensis, Licht. (nec Shaw), Verz. Doubl. p. 64 (1823).

Pterocles exustus, Tem. Pl. Col. (1825) nos. 354, 360; Wagl. Syst. Av. (1827), *Pterocles*, sp. 9; Rüpp. Neue Wirbelth. (1823-35) p. 114; Less. Trait. Ornith. (1831) p. 517, sp. 9; Sykes, Proc. Zool. Soc. (1832) p. 154; Gray, Gen. B. vol. iii. p. 519 (1849); Blyth, Cat. B. Mus. Asiat. Soc. (1849) p. 249; Reich. Syn. Av. Gallinæ (1851) pl. ccix. figs. 1823-24; Jerd. Madr. Journ. vol. xii. p. 3; Hutt. Journ. Asiat. Soc. Beng. vol. xvi. p. 785; Burgess, Proc. Zool. Soc. (1855) p. 30; Von Heugl. Syst. Uebers. Vög. N.O.-Afr. (1855) p. 304; Hartl. Syst. Ornith. W.-Afr. (1857) p. 205; Adams, Proc. Zool. Soc. (1858) p. 502; Taylor, Ibis (1859) p. 50, (1867) p. 67; Irby, Ibis (1861) p. 235; Jerd. B. Ind. vol. iii. (1864) p. 502; Tristr. Proc. Zool. Soc. (1864) p. 449; Gould, B. Asia, pt. ii. pl. 13; Adams, Ibis (1864) p. 27; Allen, Ibis (1864) p. 240; Tristr. Ibis (1868) p. 211; Beavan, Ibis (1868) p. 378; Blanf. Geol. & Zool. Abyss. (1870) p. 410; Shelley, Ibis (1871) p. 153; id. B. Egypt (1872) p. 218; Lloyd, Ibis (1873) p. 415; Hume, Str. Feath. (1873) vol. i. p. 225; Adams, Str. Feath. (1873) vol. i. p. 392; Von Heugl. Ornith. Nordost-Afr. Band ii. p. 855 (1873); id. Journ. für Ornith. (1875) p. 57; Butl. Str. Feath. (1875) vol. iii. p. 4; Fairb. Str. Feath. (1876) vol. iv. p. 262.

Pteroclorus exustus, Ball, Str. Feath. (1874) vol. ii. p. 426.

Bar-titar, *Bakt-titar*, *Kumar-tit*, Hind.; *Kuhar*, N.W. Prov.; *Jam polanka*, Tel.; *Kal-Kondari*, Tam. (Jerdon). *Gutta* in Egypt (Adams).

Hab. N.E. Africa and Arabia (*Heuglin*); Egypt and Nubia (*Shelley*); Upper Egypt (*Adams*); Hindustan, Middle and Western Asia, Southern Europe, North Africa (*Blyth*); Abyssinia (*Blanford*); Senegal, Mus. Berl. (*Hartlaub*); Casamanze (*Verreaux*); Nubia and Abyssinia (*Rüppell*); Palestine (*Tristram*); India, gene-

rally in desert places, unknown in Malabar, in wooded districts of Central India, in Lower Bengal, and in Assam, Sylhet, and Burmah (Jerdon); Dukhun (Sykes); Punjaub (Adams); Ahmednagar district, Khandala (Fairbanks); Chotah Nagpur (Ball); Oudh (Irby); common in Sindh (Hume); Sambhur lake (Adams); Umballah and Morar (Beavan); Kattiawar (Lloyd).

This species, Capt. Shelley states (*l. c.*), is the most abundant of the various kinds of Sand-Grouse met with in Egypt, and ranges throughout that country, as well as Nubia. It goes in small flocks, uttering, when on the wing, a peculiar loud note which is heard for a considerable distance in the morning and evening, when on their way to their drinking-places. The localities in which he found them most abundant were Fayoom, Golosaneh, Karnak, and between Silsilis and Kom Ombo. Its nest is simply a hole in the sand, lined with dried grass; and it breeds in April.

According to Jerdon this is the most common Sand-Grouse found in India, and is met with in every part of the country, except in the wooded districts. It frequents the open plains and ploughed lands or fallow fields. This species feeds early in the morning, and between eight and nine o'clock goes to drink, and again visits the water at about four o'clock in the afternoon. At such times thousands congregate at these places; and they come from all quarters, flying at a great height, and announcing their presence by a peculiar loud piercing call. They stay but a moment at the water-side, and then fly off. They are difficult to approach, and when on the ground can hardly be distinguished from it, the colour of their plumage assimilating so closely. This Sand-Grouse feeds on various hard seeds, especially of the *Alysicarpi*, *Desmodium*, &c., as well as on grass-seeds and grain. It breeds in the Deccan and Southern India from December to May, and still later in Central India. The eggs are laid on the bare ground, and are of a greenish colour, thickly spotted with grey and brown, and nearly of the same thickness at both ends. If kept some time after being killed, this bird is very good as an article of food. In Oudh, says Capt. Irby, this species is very common on the sandy plains from January to July. Two eggs, which he found in June, resembled in size and markings those of *Caprimulgus europæus*; and if there had been any trees near the place, he would have referred them to some species of Goatsucker. Dr. Adams says that this bird, when wounded, spreads out its tail and wings, hiding its head under the breast, and emits a series of chuckles, like a fowl. As with the same species in India, he found the flesh very dry, and the only possible way of making them fit for the table was to remove the skin before cooking them.

Male. Head, neck, entire upper parts, and breast sandy buff, lightest on the breast, and having a greenish shade on the back. Throat orange. Across the breast at the shoulders is a narrow black band, occasionally edged on its upperside with white. Rest of underparts bright chesnut, with the centre of the abdomen black. Wings like the back, each feather margined at the tip with a narrow line of blackish chestnut, and the outer webs of secondaries and

greater coverts yellow on the terminal third. Some of the feathers also have a small white spot just beneath the dark line on the tip. Primaries brownish black; the inner ones tipped with white, broadest on the inner web. Central rectrices much lengthened beyond the rest, deep buff, indistinctly mottled with dark brown near the base, with an irregular scalloped subterminal black bar, then buffy white, and the lengthened narrow apical portion black. Lateral ones with the inner webs dark rufous brown; outer ones buff, barred with blackish brown, a subterminal black bar, and white tips. Under tail-coverts brownish black, with white tips. Thighs chestnut, tarsi covered in front with short buffy-white feathers.

Total length $9\frac{3}{4}$ inches, wings 7, tail $3\frac{1}{2}$, bill along gape $\frac{5}{8}$.

Female. Top of head buff, darkest in the centre, each feather with a central line of black. Throat and loreal space pale orange-yellow. Sides and back of neck and breast bright buff, each feather with a wedge-shaped central black line, the widest part being at the tip, and also with another black bar crossing it in the centre. The feathers on the lower part of the breast are tipped with black, margined on the upperside with white, forming an irregular band across, below which there is an unspotted light buff space. Flanks, abdomen, thighs, and vent black, narrowly barred with rufous. Upper parts bright buff, barred narrowly with jet-black. Wing-coverts like the back, the lesser ones tipped with blackish chestnut, the greater ones broadly tipped with light yellow, forming a broad band on lower side of the wing when closed. Secondaries light buff, barred with black, the tips of outer webs of some of the outer secondaries light yellow. Primaries chocolate-brown, broadly tipped on inner webs with white. Upper tail-coverts like the back. Median pair of rectrices extended beyond the rest, attenuated for their terminal third, which is brownish black, the remaining portion being bright buff, barred narrowly with black; lateral feathers dark brown on inner webs, bright buff on outer, with numerous bars of black, and tips white. Under tail-coverts yellowish white, barred with black. Bill brownish black.

Total length $11\frac{3}{4}$ inches, wing 7, tail to end of central rectrices $4\frac{5}{8}$, bill along gape $\frac{5}{8}$.

8. PTEROCLES ALCHATA.

The Little Pin-tailed Grouse, Edw. Glean. p. 84, pl. 249 (1758).

Tetrao alchata, Linn. Syst. Nat. (1776) vol. i. p. 276; Gmel. Syst. Nat. (1788) vol. i. p. 754; Lath. Ind. Orn. vol. ii. p. 641 (1790); Bonnat. Ency. Méth. (1790) tom. ii. p. 203, pl. 92. fig. 3.

Pin-tailed Grouse, Lath. Gen. Syn. (1783) vol. ii. pt. 2nd, p. 748.

Pterocles setarius, Temm. Pig. et Gallin. vol. iii. pp. 256, 714 (1815); id. Mon. Ornith. vol. ii. p. 478 (1820), vol. iv. p. 330; Wagl. Syst. Av. (1829) *Pterocles*, sp. 6; Less. Trait. Ornith. (1831) p. 516, sp. 6; Parker, Proc. Zool. Soc. (1864) p. 258; Taczanow. Jour. für Ornith. (1870) p. 51.

Ænas cata, Vieill. Nouv. Dict. Hist. Nat. vol. xii. p. 418 (1817).

Pin-tailed Grouse, Lath. Gen. Hist. B. vol. viii. (1823) p. 250.

Pterocles alchata, Licht. Verz. Doubl. p. 64 (1823); Tristr. Proc. Zool. Soc. (1864) p. 449; Jerd. B. Ind. vol. iii. p. 500 (1864); Gould, B. Eur. pl. 258; Blyth, Cat. B. Mus. Asiat. Soc. (1849) p. 249; Gray, Gen. B. vol. iii. p. 518; Reich. Syn. Av. (1851) Gallinæ, pl. ccvii. figs. 1813-14; Heugl. Syst. Uebers. Vög. Nordost-Afr. (1855) p. 303; Salv. Ibis (1859) p. 352; Tristr. Ibis (1860) p. 70; Powys, Ibis (1860) p. 239; Wright, Ibis (1864) p. 139; Lilford, Ibis (1866) p. 379; Bartl. Proc. Zool. Soc. (1866) p. 78; Drake Ibis (1867) p. 428; Beaven, Ibis (1868) p. 377; Smith, Ibis (1868) p. 451; Hume, Str. Feath. (1873) vol. i. p. 221; Garrod, Proc. Zool. Soc. (1873) p. 468; Severzov, Journ. für Ornith. (1873) pp. 385, 386; Von Heugl. Ornith. Nordost-Afr. (1873) vol. ii. p. 853.

Tetrao chata, Pall. Zoogr. Rosso-Asiat. vol. ii. p. 73 (1831).

Pterocles caspius, Ménétr. Cat. Rais. de Zool. p. 47 (1832).

Pteroclorus alchata, Bon. Compt. Rend. vol. xlii. p. 880 (1856).

El-Guettha Arab (Tristram). *Ganga* in Spain (Lilford). *El Koudre* in Tangiers (Drake). *Corticol* in Portugal (Smith).

Hab. Middle Asia, Afghanistan, Syria, Spain, N. Africa (*Blyth*); Portugal (*Smith*); common in Spain (*Lelford*); Tangier (*Drake*); Harakta Plains of Eastern Atlas (*Salvin*); Malta (*Wright*); Palestine (*Tristram*); Punjaub and Sindh (*Jerdon*); Jacobabad, Sindh, Nundan, near Altock, Peshawur valley, Abbotabad, and isolated localities in Huzara (*Hume*); Western Persia (*De Filippi*).

Jerdon says that this is a rare bird in India, only a few finding their way across the Sutlej. It flies in flocks, and is shy and wary. The specific appellation is taken from its Arabic name *El-chata* or *El-katta*; and in India there does not seem to be any special native name for the bird.

Tristram found this Sand-Grouse in vast flocks in winter in the Mزاب and Tonarick country; and, except in the breeding-season, it was very difficult to approach, and when packed it is necessary to be well-mounted to get a second shot. It is even more vigorous upon the wing than *P. arenarius*, and when on the ground is very garrulous. Its breeding-habits are exactly the same as those of the species just named; but the egg has a much richer fawn-coloured tint, and is covered and sometimes zoned with large maroon-red blotches.

In Spain, as stated by Lord Lilford (*l. c.*), this species, as well as *P. arenarius*, is common in many parts of the Castilles, La Mancha, Murcia, Andalusia, Estremadura, and in some districts of Aragon and Catalonia. They delight in bare and stony ground; and even in "hungry Spain" they are considered "muy male carne."

Male. Top of head and nape dark greyish brown; superciliary stripe and sides of the throat deep orange; ear-coverts yellowish; a black line goes from behind the eye and down the sides of the nape. Throat black; upper part of breast greenish buff; rest of breast chestnut, bounded above and below with a narrow black line; remainder of underparts white. The back has the feathers vinous at base, rest pale yellowish green, with a yellowish spot at tip.

Rump and upper tail-coverts buff, barred narrowly with black. Lesser wing-coverts pale vinous at base, then a narrow line of white followed by a broader one of pale chestnut, and then a narrow line of yellow, and tipped with pale chestnut. Some of the outer larger wing-coverts were like those just described; but the inner ones are dark, have the base dark ash, then rich yellow, and narrowly bordered with black. Inner secondaries rufous at base, barred with black, tipped with pale green, and a conspicuous yellow spot in the centre. Rest of secondaries pale yellowish-green, with yellow on their outer webs near the tips. Primaries ashy grey, margined on inner webs with white; the secondaries and tertiaries inclined to buff along the shaft on inner webs; shafts black. Tail-feathers buff, barred with black and tipped with white; the two central ones entirely black on their apical half, are extremely narrow, and extend far beyond the other rectrices. Under tail-coverts buff, barred with black, and tipped with white. Feathers of the tarsi white. Bill horn-brown. Bare space around the eye lead-colour; iris dark brown.

Total length $13\frac{1}{4}$ inches, wing 8, tail to end of longest rectrices 6, bill along gape $\frac{1}{16}$.

Female. Top of head and back of neck deep buff, barred with black. Sides of face and neck orange-yellow. Chin and throat white. A black band around the lower part of neck, but not extending onto the back of the neck, beneath which is a broad light chestnut band bordered above and below with black as in the male. Entire underparts pure white. Upper parts buff, narrowly barred with black. Wing-coverts buff, barred with black, and with a grey spot on inner web near tip, this spot on some of the greater coverts being enlarged into a bar crossing the feathers near the tip. Secondaries buff, barred with black, and having a sub-terminal grey bar. Primaries like those of the males. Upper tail-coverts yellowish buff, irregularly barred with black. Rectrices like those of the male. Bill horn-colour.

Total length 13 inches, wing $7\frac{3}{4}$, tail $5\frac{3}{8}$, bill at gape $\frac{5}{8}$.

9. PTEROCLES NAMAQUA.

Namaqua Grouse, Lath. Gen. Syn. B. (1783), vol. ii. pt. 2, p. 750; id. Suppl. p. 215; id. Gen. Hist. B. vol. viii. (1823) p. 251.

Tetrao namaqua, Gmel. Syst. Nat. (1788) vol. i. p. 754; Lath. Ind. Orn. vol. ii. p. 642, sp. 19; Sparrm. Voy. vol. i. p. 153; Bonnat. Enc. Méth. (1790) tom. ii. p. 204.

Pterocles tachypetes, Temm. Pig. et Gall. (1815) pp. 274, 715; Wagl. Syst. Av. (1827), *Pterocles*, sp. 7; Less. Trait. Ornith. (1831) p. 517, sp. 7; Layard, B. S. Afr. (1867) p. 277; Ayres, Ibis (1871) p. 262.

Ænas namaqua, Vieill. Nouv. Dict. Hist. Nat. (1817) vol. xii. p. 422.

Pterocles simplex, Less. Trait. Ornith. (1831) p. 517.

Pterocles namaqua, Gray, Gen. B. vol. iii. p. 518; Bocage, Journ. für Ornith. (1876) p. 303.

Pteroclorus namaqua, Reich. Syn. Av. *Gallinæ* (1851) pl. ccix.; Anderss. Dam.-l. (1872) p. 242.

Hab. Palestine (*Tristram*); Transvaal, between Potchefstroom and Marico (*Ayres*); Damara-land (*Andersson*).

Mr. Ayres first met with this species in the Transvaal between Potchefstroom and Marico, and afterwards along the river Limpopo, but nowhere very abundant. They squat on the approach of danger, and rise suddenly, with a quick beat of the wings; and their flight is very rapid. The iris is dusky, and eyelids yellow.

According to Layard, the Namaqua Grouse is very abundant on the Karroo plains throughout the Cape colony and in Namaqua-land. It congregates in small parties, runs with considerable swiftness, and the flight is very rapid. Its note, when on the wing, resembles the piping of a Plover, to which bird this species bears a considerable resemblance. It sometimes, during droughts, extends its migrations to the Cape Flats. It lays from seven to ten eggs, light cream-colour, spotted with brown and purple, axis 17^{'''}, diameter 12^{'''}. Andersson states that this bird is common in some parts of Damara-land, and generally comes to the water about eight or nine o'clock in the morning. They circle around at a considerable height, and frequently do not attempt to descend until directly over the spot, when they shoot down with great velocity, describing more or less of semicircles before they alight. They feed on seeds, berries, and small bulbs, and swallow gravel to assist the digestion.

Male. Top of head dark brown. Throat orange. Upper part of breast vinous, crossed on the lower part by a band of white, followed by another of reddish chestnut. Flanks dark vinous grey. Middle of abdomen chestnut; vent and under tail-coverts yellowish white. Upper parts dark brown, lighter on the rump and upper tail-coverts, and washed with green. Scapulars dark brown, with a subterminal light buff bar and purplish-grey tips. Wing-coverts ashy brown, subterminal buffy white bar, and chestnut tips. Secondaries dark vinous brown, inclining to light buff near their tips. Primaries rufous brown; shafts rufous, except those of first and second, which are white, and the sixth to tenth broadly margined with white on their inner webs towards their tips. Median rectrices extending slightly beyond the rest, rufous brown, graduating into dark brown on their attenuated portion; rest of tail rufous brown, and tipped with yellowish white. Bill horn-colour. Feathers on tarsus buffy white.

Total length 10 $\frac{5}{8}$ inches, wing 7, tail 4 $\frac{1}{2}$, bill along gape $\frac{1}{2}$.

Young male. Differs in having the entire underparts very deep vinous buff, inclining to rufous on the abdomen, and ochraceous on the vent and under tail-coverts. Feathers of the back and wings barred with rufous and black irregularly, and tipped with greyish purple on the scapulars and some of the inner secondaries. Tail buff, barred narrowly with dark brown. Head, throat, and back of neck as in the adult males.

Female. Top of head, back, and sides of neck and breast deep

buff; feathers of the first with a central streak of black; those of the other parts barred irregularly with the same colour. Rest of underparts buffy white, graduating into light buff upon the flanks and lower tail-coverts, and all, except the last-named, barred narrowly with black. Upper parts buff, barred irregularly with narrow lines of black, and some of the scapulars tipped with greyish purple as in the male. Primaries same as the male. Median pair of rectrices slightly elongated beyond the rest, reddish-buff, barred narrowly with black, and with black tips; the lateral feathers blackish brown, with irregular reddish-buff bars on the outer webs, and with yellowish-white tips. On the inner webs the buff bars are very faintly indicated, and on some of the feathers they are obsolete. Bill horn-brown.

Total length $9\frac{7}{8}$ inches, wing $6\frac{5}{8}$, tail $4\frac{1}{2}$, bill along gape $\frac{1}{2}$.

10. PTEROCLES FASCIATUS.

Tringa fasciata, Scop. Delic. Faun. et Flor. Insubr. vol. ii. p. 92 (1786).

Indian Grouse, Lath. Gen. Syn. (1783) p. 752; id. Gen. Hist. B. vol. viii. (1823) p. 260.

Tetrao indicus, Gmel. Syst. Nat. (1788) vol. i. p. 755; Bonnat. Ency. Méth. (1790) tom. i. p. 201.

Perdix indica, Lath. Ind. Orn. vol. ii. p. 650, sp. 23 (1790).

Enas indicus, Vieill. Nouv. Dict. Hist. Nat. (1817) p. 422.

Pterocles quadricinctus (nec Temm.), Less. Trait. Ornith. (1831), p. 526, sp. 3; Sykes, Proc. Zool. Soc. (1832) p. 155; Burgess, Proc. Zool. Soc. (1855) p. 30.

Pterocles fasciatus, Gray, Gen. B. vol. iii. p. 518; Blyth, Cat. Birds Mus. Asiat. Soc. (1849) p. 249; Jerd. Ind. Ornith. pls. 10, 36; Reich. Syn. Av. Gallin. (1851) pl. ccviii. figs. 1815-16; Adams, Proc. Zool. Soc. (1868) p. 502; Jerd. B. Ind. vol. iii. p. 498 (1864); Gould, B. Asia, pt. ii. pl. 14; Beavan, Ibis (1868) p. 378; Lloyd, Ibis (1873) p. 415; Adams, Str. Feath. (1873) vol. i. p. 391; Ball, Str. Feath. (1873) vol. ii. p. 426; Fairb. Str. Feath. (1876) vol. iv. p. 262; Wise, Str. Feath. (1876) vol. iv. p. 230; Butler, Str. Feath. (1877) vol. v. p. 231.

Handeri in the south; *Boot-bur* in the north-west; *Sunda polanka* Tel. (Jerdon).

Hab. India generally, except Malabar and Lower Bengal (*Jerdon*); Dukhan (*Sykes*); Punjab (*Adams*); Deccan (*Burgess*); Khandesh (*Wise*); Morar, near Gwalior, Umballah (*Beavan*); Kattiawar (*Lloyd*); Hindustan generally (*Blyth*); Sambhur lake (*Adams*); Chota Nagpur (*Ball*); Ahmednagar district, Kandalia (*Fairbank*).

Jerdon (*l. c.*) states that this species is found over the greater part of India, but not in Malabar and Lower Bengal, and is not abundant anywhere. He had seen it in the Carnatic, the Deccan, and in Central India; and Adams records it as pretty common in the jungles around the base of the Sewalik range in the Punjab. Unlike other Sand-Grouse, it frequents thickets, and chiefly bushy and

rocky hills. It is generally met with in pairs, towards the end of the rains in parties of eight or ten, and when flushed rises with a low chuckling call, and after a short low flight drops again into cover. The eggs, cylindrical in form, are a dull earthy green, with a few dusky spots. It was procured in Kattiawar, Western India, by Capt. Lloyd, in the Than district, where one evening a small party, coming to drink after dusk, alighted in front of his tent. He thought they were Goatsuckers; and on firing at them was surprised to find he had secured a specimen of this Sand-Grouse. In the vicinity of Sambhur lake, Central India, Mr. Adams found this species common about all the low ranges of hills. The nest was simply a hollow scraped in the ground, with a number of small pieces of stone round the edge, and some loose grass for a lining. The number of eggs varied from two to three; in one instance, however, four were found. He gives their colour as very different from that mentioned by Jerdon, viz. a deep to pale salmon-colour when fresh; but, on being blown, in a few days this tint changes to a rich cream-colour, and the spots are light lavender and rusty. They are of a blunt oval form, 1.4 inch in length by 1 inch in breadth.

Male. A conspicuous black band crosses the forehead, below which, covering the nostrils and also over each eye, is a pure white spot. Top of head and occiput buff, streaked with narrow black lines. Sides of head, throat, neck, and upper part of breast uniform sandy buff. Upper part of back similarly coloured, but darker. Across the breast, extending from the shoulders of the wing, are, first, a band of deep chestnut, widest in the centre, succeeded by a broader one of light buff, beneath which is an irregular one of black. Rest of underparts black, narrowly banded with white or buffy white. Feathers of back and rump generally crossed by three black bars, and tipped with sandy buff; and between the first and second black bar from the tip is one of white. Shoulders uniform sandy buff. Wing-coverts and outer secondaries crossed by several black and white bars, forming two or three conspicuous bands across the wing, the tips of all the feathers being fulvous. The inner secondaries are buff, barred only with black, no white. Primaries brownish black, edged on both webs with whitish. Tail and under tail-coverts fulvous, barred with black. Bill red, orbital skin lemon-yellow; irides dark brown. Feet yellowish. Total length $9\frac{1}{2}$ inches, wing 7, tail $3\frac{1}{4}$, bill at gape $\frac{5}{8}$.

Female. Throat and cheeks pale buff. Head reddish buff, streaked with black. Entire upper and under surface sandy buff, barred irregularly with brown. Tips of wing-coverts pale buff. Primaries and secondaries dark brown, edged on inner webs with white. Bill red. Dimensions about the same as the male.

11. PTEROCLES BICINCTUS.

La Gélinotte des Indes, Sonner. Voy. aux Indes Orient. et à la Chine, vol. ii. pl. 96 (1782).

Pterocles bicinctus, Temm. Fig. et Gall. tom. iii. pp. 247, 713; Gray, Gen. B. vol. iii. p. 518.

Enas bicincta, Vieill. Nouv. Dict. Hist. Nat. vol. xii. (1817) p. 421; id. Gal. Ois. vol. ii. (1834) p. 60 (text).

Double-banded Grouse, Lath. Gen. Hist. B. vol. viii. (1823) p. 259.

Pterocles bicinctus, Wagl. Syst. Av. (1827) *Pterocles*, sp. 2; Less. Trait. Ornith. (1831) p. 516, sp. 2; Reich. Syn. Av. Gallinæ (1851) pl. ccviii. figs. 1819-20; Strickl. and Sclat. Contr. Ornith. (1852) p. 157; Layard, Birds S. Afr. (1867) p. 278; Ayres, Ibis (1869) p. 298; Gurn. Anderss. Birds Dam. L. (1872) p. 241; Buckley, Ibis (1874) p. 385; Bocage, Journ. für Ornith. (1876) p. 303.

Hab. Transvaal, near the Limpopo (*Ayres*); Limpopo, to the Matabili country (*Buckley*); Damara and Great Namaqua Lands (*Andersson*).

This is the most common of the Sand-Grouse found near the Limpopo, according to Mr. Ayres, with perhaps the exception of *P. gutturalis*. The greater number in June were in flocks, although some few had paired and were breeding. The eggs are laid on the bare ground, and are brownish pink, spotted and blotched all over, particularly at the thick end, with a lighter tint of the same colour. Size $1\frac{6}{16}$ by $\frac{15}{16}$ inch. This species was also found to be very abundant from the Limpopo to the Matabili country by Mr. Buckley; and in the evening they come down in immense flocks to the water-holes to drink. During the day he met with them chiefly in pairs, or three individuals together; and when they rose from the ground they uttered a creaking note. According to Andersson, this species is very abundant in Damara and Great Namaqua Lands, and can always be met with during the dry season at any of the permanent watering-places to which they resort at morning and evening. When dispersed they usually go in pairs, and feed chiefly on the seeds of grasses and berries, mingling with their food considerable quantities of coarse sand.

Their flesh, though very white, is excessively tough, and it is best to skin the bird before cooking. The iris is deep red, the skin round the eye chrome-yellow.

The figure given by Sonnerat in his 'Voyage aux Indes Orientales et à la Chine' is evidently referable to this species; from having only two bands upon the breast, a white one succeeded by a black one, it cannot possibly represent *P. fasciatus*, Scop., to which it has been referred by some authors. In his text Sonnerat only mentions one band, the *white* one, which does not describe any species of Sand Grouse at present known. The locality, "côte de Coromandel," however, is not one of the habitats of the present species, so far as I am aware, as it is apparently solely found in Africa.

The specimens described by Temminck were given to him by Le Vaillant, who procured them in Namaqualand.

Male. Black bar across the forehead, in front of which and over each eye is a white spot, these latter sometimes coalescing and forming a white bar behind the black one. Top of head and occiput rufous, streaked with black. Throat, sides of neck, upper part of

back, breast, and shoulders of the wing uniform sandy buff, with a greenish tinge. Lower part of breast crossed by two rather broad bands, the upper one pure white, the lower jet-black. Rest of underparts barred narrowly with buffy white and brownish black. Feathers of the back rufous, barred with greyish black, those on the rump tipped with yellowish white. Greater wing-coverts and secondaries brownish grey, with a white spot at the tip of each feather. Primaries rufous-brown, all but the first two tipped with white. Tail, with the upper and under coverts, light buff, barred with brownish black. Bill reddish; feet yellow.

Total length $9\frac{3}{4}$ inches, wing $6\frac{5}{8}$, tail $3\frac{1}{2}$, bill (along gape) $\frac{5}{8}$.

Another, younger male specimen differs in having a narrow black line over each eye, between it and the white mark, and also by having the back and inner secondaries deep rufous, irregularly barred with black, the wing-feathers tipped with buffy white. Outer secondaries blackish brown, like the primaries, some tipped on outer web with light buff, others with a subterminal bar of the same colour. The greater wing-coverts are blackish brown tipped with yellowish white.

Female. Head, back, neck, and breast buff, irregularly barred with brownish black, and tipped with buffy white on the back and breast. No band across the breast. Flanks, abdomen, and vent barred with white and black. Wings irregularly barred with black and reddish buff, the feathers tipped with white; primaries chocolate-brown. Tail and its coverts reddish buff, barred with black and tipped with fulvous. Bill reddish, tip black; feet yellowish.

Total length $9\frac{3}{4}$ inches, wing 7, tail $3\frac{1}{2}$, bill along gape $\frac{5}{8}$.

12. PTEROCLES QUADRICINCTUS.

Pterocles quadricinctus, Temm. Fig. et Gallin. (1815) vol. iii. pp. 252, 713; Wagl. Syst. Av. (1827), *Pterocles*, sp. 3; Strickl. Proc. Zool. Soc. (1850) p. 220; id. Ann. & Mag. Nat. Hist. 2nd ser. vol. ix. p. 347; Heugl. Syst. Uebers. Vög. N.O.-Afr. (1855) p. 304; Hartl. Syst. Ornith. W.-Afr. (1857) p. 205.

Enas bicinctus, Vieill. (nec Temm.) Gal. Ois. pl. 220, nec text (1834).

Pterocles tricinatus, Swains. Birds W. Afr. (1862) vol. ii. pl. 23; Von Heugl. Ornith. Nordost-Afr. (1873) Band ii. p. 867.

Hab. Sennaar, Abyssinia (*Heuglin*); West Africa (*Strickland*).

Some confusion has been created in the synonymy of this species by Vieillot having figured it in his 'Galerie des Oiseaux' as *bicinctus* (a name given by Temminck to quite a different species), while in the text he has correctly described the true *bicinctus* and not the bird represented in his plate. Although Vieillot's figure only shows three bands across the breast, yet Temminck asserts, in the 'Planches Coloriées' (genre *Ganga*, footnote), that it is his *quadricinctus*; and as it is natural to suppose he knew his own species when he saw it, I have taken his determination as the correct one, more especially as I have never been able to find a specimen of *Pterocles* with four well-defined bands across the breast. So far as I can judge from the

specimens I have seen, the name *tricinctus*, given to this species by Swainson, is by far the most appropriate one; and it is to be regretted that it cannot be employed.

Temminck also refers to the present species the bird figured and described by Sonnerat, who, he states, was the first to make it known as La Gélinothe des Indes. In this determination I believe Temminck to have been mistaken, and that he confounded Sonnerat's bird with the *Pt. bicinctus* of Temminck. The species figured by Sonnerat has but two bands on the breast, a black and a white one; and I consider it to be the *Pt. bicinctus*, Temm., and have accordingly referred it to that bird.

The only habitats I can find for *Pt. quadricinctus* are Abyssinia and Sennaar on the east coast, while Swainson gives West Africa as the place whence his specimen came. It has never, so far as I am aware, been found in India. The examples described by Temminck were in the cabinet of M. de Breukelewaert at Amsterdam.

Male. Spot on the forehead, covering the nostrils, and one over each eye white. A broad black band crosses the forehead just in front of the eyes. Top of head and occiput fulvous, streaked narrowly with black. Throat yellowish white. Nape, sides of neck, and breast uniform sandy buff. Across the lower part of the breast are three bands, the first dark chestnut, the second white, and the third black. Temminck says there is a fourth one, of white. I do not perceive this in the specimens before me; but I am inclined to think individuals vary in the number of these bars. Underparts black, narrowly barred with white. Back deep buff, barred with jet-black. Wings fulvous, the shoulders uniform, not spotted. Wing-coverts and secondaries crossed by a *single black bar, margined on both sides with white*. The innermost secondaries have numerous black bars, and *no white ones*. Tail and under-coverts deep buff, barred with black. Bill red; feet yellow.

Total length $9\frac{1}{2}$ inches, wing $7\frac{1}{2}$, tail $3\frac{3}{4}$, bill (along gape) $\frac{5}{8}$.

Specimen described from the White Nile.

Female. The entire top of head fulvous, streaked with black, and the back of neck spotted with the same. Throat white. Breast bright fulvous, without any bars, and the underparts barred with white and narrow lines of brownish black. Feathers of back and inner secondaries rufous, barred with black and margined with fulvous. Wings and outer webs of outer secondaries pale buff, crossed by several narrow jet-black bars. Inner webs of outer secondaries and primaries brownish black. Tail and its under-coverts deep buff, barred with black. Bill reddish horn-colour; feet yellow.

Total length $9\frac{1}{4}$ inches, wing $7\frac{1}{4}$, tail $3\frac{1}{4}$, bill (along gape) $\frac{5}{8}$.

13. PTEROCLES LICHTENSTEINI.

Pterocles lichtensteini, Temm. Planch. Col. (1825) no. 355, 361 Rüpp. Neue Wirbelth. (1823-38) p. 114; Wagl. Syst. Av. (1827), *Pterocles*, sp. 8; Less. Trait. Ornith. (1831) p. 516. sp. 8; Gray, Gen. B. vol. iii. p. 518 (1849) partim; Reich. Syn. Av. Gallin. (1851) pl. ccix. figs. 1827-28; Hengl. Syst. Ubers. Vög. Nord-

ost-Afr. (1855) p. 304; id. Ibis (1859) p. 343; Speke, Ibis (1860) p. 247; Blanf. Geol. & Zool. Abyss. (1870) p. 419; Hume, Ibis (1872) p. 468; Finsch & Hartl. Vög. Ost-Afr. p. 563; Hume, Str. Feath. (1873) p. 219; Von Heugl. Ornith. Nordost-Afr. (1873) Band ii. p. 865; Wise, Str. Feath. (1876) vol. iv. p. 230.

Pterocles bicinctus, Licht. (nec Temm.) Verz. Doubl. (1823) p. 65.

Hab. Very common in the Danakil and Somali countries (*Heuglin*, *Speke*); Abyssinia (*Blanford*); Egypt and Nubia (*Rüppell*); Gool Mahomed Mehur, Upper Sindh (*Hume*); Kurrachee district (*Wise*).

Blanford (*l. c.*) states that the habits of this bird in Abyssinia are the same as those of the *Pt. fasciatus* of India. It is but rarely met with in the open plains, but keeps to bush- or tree-jungle, and in such places is usually found in pairs. The drinking-hours are at daybreak and at dusk; and the scene at a spring in the evening, he says, is very interesting, the birds coming in with a constant rush until dark. Single birds and small flocks, uttering a note like "queep-queep," would fly up and down the watercourse, keeping but a few feet above the bushes, the noise of their wings announcing their presence in the dusk before the birds themselves could be seen. Mr. Blanford says they are excellent eating, the flesh, though rather hard, being of a delicious flavour. The species appears to be confined to the coast region. In the Lebka valley, at Mohabar, only 2000 feet above the sea, but few were seen at the spring in the evening; and at higher elevations none were met with.

Mr. Hume relates, in 'Stray Feathers' (1873), that he met with this species at Gool Mahomed Mehur, Upper Sindh. Only one pair were seen and procured.

Male. Forehead white, crossed by a circular jet-black line, commencing at the opening of the mouth; over each eye a black spot. Throat pale buff. Centre of breast fulvous, with a narrow black bar crossing it in the middle, and another bordering it on the lower side. Rest of plumage of body buff or buffy white, barred narrowly with black. Wings barred with black and white and tipped with buff. Scapulars in some specimens dark buff or rufous, barred with black, in others like the rest of the wing-feathers just described. Primaries dark brown, edged with yellowish white. Tail pale buff, barred with black and tipped with yellowish buff, as are also the upper and under coverts. Iris brown; orbit lemon-yellow. Bill red; feet flesh-colour.

Total length 10 inches, wing $7\frac{1}{4}$, tail $3\frac{1}{4}$, bill along gape $\frac{5}{8}$.

Female. Throat pale buff, spotted minutely with blackish brown. Breast, wings, and back light buff, inclining to rufous on the secondaries, with all the feathers crossed by numerous narrow black lines. Primaries chocolate-brown. Abdomen, flanks, and vent dull white, barred narrowly with black. Tail with its coverts buff, barred with black. Bill light horn-colour; feet yellow.

Total length 10 inches, wing $7\frac{1}{4}$, tail $3\frac{1}{4}$, bill along gape $\frac{5}{8}$.

14. *PTEROCLES DECORATUS*.

Pterocles decoratus, Cab. Journ. für Ornith. (1868) p. 413 ; id. Von der Deck. Reis. vol. iii. p. 43, pl. 13 (1869) ; Finsch & Hartl. Vög. Ost-Afr. p. 565 ; Von Heugl. Ornith. Nordost-Afr. (1873) Band ii. p. 870.

Hab. Interior of East Africa, Lake Jipe.

I have never seen a specimen of this bird, and only know it from Cabanis's description and figure. He compares it to *tricinctus*, Swains. (= *quadricinctus*, Temm.), but says it is smaller, and gives no description of the wings. It is, however, a very distinct species, and can easily be recognized by the characters given below, most of which are not found in any other known species.

Male. Centre of forehead white, a large spot on each side and throat black. Top of head, neck, and back reddish grey, crossed with narrow lines of black. Superciliary stripe buffy white. Sides of head and breast sandy buff, with a greenish gloss, beneath which is an irregular black bar extending upwards to the shoulders of the wing, succeeded by a broad white band. Abdomen and flanks black, the feathers margined with rufous.

"Total length 9" ; bill along gape 7" ; wing 6.5" ; tail 2" 7".

Genus SYRRHAPTES.

Body large, comparatively heavy. Bill rather small, delicate, pointed at tip ; culmen slightly curved, gonys ascending. Nostrils basal, hidden in feathers. Wings very long, pointed, first primary longest ; primaries in one species filamentous. Tail cuneate, median pair of rectrices always lengthened beyond the rest, apical portion attenuated and pointed. Tarsus short, entirely covered by short feathers. Feet tridactyle ; hallux obsolete ; toes very short, completely hidden in feathers above ; the soles bare and scaly. Claws moderate, curved and acute.

Key to the Species.

A. Median rectrices prolonged far beyond the rest.

- a. Primaries filamentous. Breast uniform vinous, tinged with green on upper part, and crossed in the centre by an irregular bar formed of the narrow black lines at the tips of the feathers. Abdomen blackish... 1. *S. paradoxus*.
- b. Primaries not filamentous. Upper part of breast buffy white, irregularly barred with black ; rest of underparts pale buff, becoming white on the under tail-coverts 2. *S. tibetanus*.

1. SYRRHAPTES PARADOXUS.

Tetrao paradoxus, Pall. Reis. Russ. Reichs, vol. ii. App. p. 712, tab. F (1773) ; Gmel. Syst. Nat. (1788) vol. i. p. 755. sp. 30 ; Lath. Ind. Ornith. vol. ii. p. 643. sp. 20 (1790) ; Bonnat. Ency. Méth. (1790) tom. ii. p. 205, pl. 93. fig. 1 ; Pall. Zoogr. Rosso-Asiat. vol. ii. p. 74 (1831).

Heteroclitus Grous, Lath. Gen. Syn. Birds, vol. iv. p. 753 (1783) ; id. Gen. Hist. Birds, vol. viii. (1823) p. 261.

Syrrhaptes paradoxus, Illig. Prodr. (1811) p. 243.

Syrrhaptes pallasii, Temm. Pig. et Gallin. vol. iii. pp. 282, 716 (1815); id. Planch. Col. 95.

Heteroclitus tartaricus, Vieill. Nouv. Dict. Hist. Nat. vol. xiv. p. 453 (1817).

Syrrhaptes paradoxus, Licht. in Evers. Reise nach Buch. p. 134 (1823); Gray, Gen. B. vol. iii. p. 519; Reich. Syn. Av. Gallin. (1851) pl. ccvii. figs. 1807-8; Moore, Ibis (1860) pl. iv. p. 105; Swinh. Ibis (1861) p. 341; Newt. P. Z. S. (1861) pp. 203, 397; Wortley, P. Z. S. (1861) p. 196; Parker, P. Z. S. (1862) p. 257, (1863) p. 516; Swinh. P. Z. S. (1863) p. 306; Radde, Reis. S. O.-Siber. (1863) vol. ii. p. 287, pl. xiv. fig. 3 (egg); Newt. Ibis (1864) p. 185; Salvad. Ibis (1864) p. 228; Von Droste, Journ. für Orn. (1868) p. 406; Müll. Journ. für Orn. (1869) p. 118; Von Homey. Journ. für Orn. (1870) p. 170; Malmgr. Journ. für Ornith. (1870) p. 295; Fritsch, Journ. für Orn. (1871) p. 312; Swinh. P. Z. S. (1871) p. 398; Severzov, Journ. für Orn. (1873) p. 380; Von Heugl. Journ. für Orn. (1874) p. 399; Taczanow. Bull. Soc. Zool. France (1876) vol. i. p. 241; Dress. Ibis (1876) p. 322; id. B. Eur. pt. 53 (1877) pl.; Prjevalsky, in Rowl. Ornith. Misc. pt. ix. p. 382; David & Oust. Ois. de la Chine (1877) p. 389.

Tetrao arenaria, Pall. Zoogr. Rosso-Asiat. (1831) pl. 53, nec text.

Syrrhaptes heteroclita, Vieill. Gal. Ois. vol. ii. p. 64, pl. 222 (1834).

Stepnaya kuritza, Mongolia (Prejevalsky).

Hab. Tientsin, China (*Wortley*); Pekin and Tientsin (*Swinhoe*); Turkestan (*Severtzov*); Mongolia (*Prjevalsky*); Kirghis steppes, Donaria, plains of Petchely (*David & Oust.*).

Pallas's Sand-Grouse is essentially an Asiatic species, making its home in the arid Kirghis steppes, the great Gobi desert, and eastward through Mongolia to the plains between Pekin and Tientsin in North China, where it is especially numerous during the winter. The year 1853 is the earliest in which this bird's presence is recorded in Europe, Möschler having met with it at Sarepta, on the Volga (Naum. vol. iii. p. 305). In 1859 a few specimens were obtained in various parts of Western Europe; but in 1863 a great number of this species, estimated at many hundreds, suddenly appeared in many parts of Europe, constituting a veritable ornithological "Tatar" invasion, as it was aptly called by the historian of this remarkable event. The birds proceeded as far as Ireland, in the west, to the Færoes, in the north, and to Perpignan in France, to the south. Great numbers of them were killed; and it is doubtful if many survived to return to their eastern resorts. The cause of this singular migration has never been ascertained.

About the plains between Peking and Tientsin, according to Swinhoe, flocks of hundreds of this species constantly pass, flying swiftly like the Golden Plover. The natives call them "Sha-chee," or Sand-fowl. They are generally caught in nets; and after a fall of snow a space is cleared, upon which the net is placed and

the place strewed with small green beans. Upon these catching the eyes of the birds, the flocks descend into the snare and are trapped. Great numbers could be taken in this way. Although shy when on the ground, yet on the wing they would dart within a few yards of a person. Their cry was a kind of melodious chuckle. According to native testimony, they are numerous on the great plains of Tartary beyond the Great Wall, where they breed in the sand. In Mongolia, according to Prjevalsky, as given in Rowley's 'Ornithological Miscellany,' this is one of the most characteristic birds, and is found both in the steppes and deserts. In summer they go beyond Lake Baikal in the north to breed, but spend the winter in the Gobi desert and in Ala-shan. They go in enormous flocks, and feed chiefly upon the seeds of *Agriophyllum gobicum*. They fly rapidly, with a peculiar noise of the wings; and at a distance the sound a flock makes is like the sighing of the wind. When flying they utter a note like "*truck-turuck, truck-turuck*;" and small flocks are accustomed to rise in the air and swoop down towards the ground, as Rooks do when migrating. On the ground they run clumsily, and their tracks much resemble those of small mammals. Like the species of *Pterocles*, these birds visit some drinking-place every morning and evening, but never settle without first describing a circle to assure themselves that there is no danger. Prjevalsky also met with this species in the Hoang-ho valley in South-east Mongolia, and also about Kalgan. This species deposits its eggs in the sand; and the female does not sit very closely, but leaves her charge when approached, and also every morning and evening exposes the eggs to the weather, in order to visit the drinking-places. It is a very shy bird, and takes wing generally before one can get near enough to shoot. *Falco hendersoni* persecutes them, but cannot always catch them.

Male. Top of head, occiput, back of neck, a line behind the ear-coverts, and breast grey; on the forehead an ochraceous tinge; chin pale buff. Throat, ear-coverts, and a line on each side of the upper part of the hind neck dark orange. Across the breast a band of dull white, each feather margined narrowly with black. Back and wings vinous, the former barred with black. Outer webs of the greater coverts chestnut, forming a conspicuous bar along the wing when closed. Spurious wing-feathers buff, with a central black line. Primaries light ashy grey on outer webs, dark brown on inner; the fifth to ninth conspicuously margined on both webs with light buff. The first primary considerably elongated and attenuated. Abdomen jet-black. Vent and under tail-coverts pure white. Tail grey, like the primaries, scalloped on the edges of the feathers with buff and tipped with white. The median pair elongated, filamentous, their lengthened portion brownish black. Tarsi and toes thickly covered with short buffy-white feathers. Bill yellowish brown; iris dark brown; nails black.

Total length $14\frac{3}{4}$ inches, wing to end of first primary 10, tail to end of median rectrices $7\frac{1}{2}$, bill along gape $\frac{1}{2}$.

Young. Top of head buff, streaked with black. Throat buffy

white, with a narrow black line bounding its lower edge. Upper part of breast grey; abdomen and a spot on the centre of flanks dark chestnut; chest and upper part of flanks, rest of underparts, and under tail-coverts pure white. Entire upper parts buff; secondaries and lesser wing-coverts barred irregularly with black. Greater wing-coverts chestnut on their outer webs. Spurious wing-feathers buff, with a central black line. Primaries grey on outer webs, dark brown on inner, and margined on the innermost ones with buff. Tail dark grey, tipped with white and barred on the inner webs with buff, the outer webs having only a slight buff edging. First primary and median rectrices filamentous, the lengthened portion brownish black. Tarsi and toes covered with greyish feathers. Bill brown.

Total length $10\frac{3}{4}$ inches, wing to end of lengthened primary $8\frac{1}{4}$, tail to end of median rectrices $5\frac{3}{4}$, bill along gape $\frac{3}{8}$.

I have not seen this stage of plumage described by any writer. There are two specimens in the Paris Museum—one a little more mature than the other, with the bar across the breast commencing to show as in the adult male.

Female. Crown and neck buff, striated with black. Throat ochraceous yellow, feathers edged with black. The upper parts like those of the male, but barred more closely with black; and the wing-coverts are spotted with black. Across the throat is a black band; and the sides of the neck and breast are spotted with black. Rest of plumage like that of the male; but the primaries and median rectrices are not so lengthened. The dimensions are about the same as those of the male.

2. SYRRHAPTES TIBETANUS.

Syrrhaptes tibetanus, Gould, Proc. Zool. Soc. (1850) p. 92; id. B. Asia, pt. ii. pl. 12; Reich. Syn. Av. Gallin. (1851) pl. ccvii. b. figs. 3020–21; Adams, Proc. Zool. Soc. (1858) p. 502, (1859) p. 186; Hend. & Hume, Lahore to Yark. (1873) p. 279; Prjevalsky in Rowl. Orn. Misc. pt. ix. p. 384 (1877).

Kaling, Tibet and Ladák (Henderson), *Stepnaya Kuritza*, *Tibetskaya* (Prjevalsky).

Hab. Salt Lakes of Ladakh (*Adams*); Karakash valley, Yarkand (*Henderson*); Northern Tibet, steppes of Kokonor (*Prjevalsky*).

Mr. Henderson (*l. c.*) says that this species was met with by the Yarkand Expedition in the Karakash valley towards the end of July, also at a lake twenty miles south-west of Mallik Shāh, and was very abundant at Chāgra, above the Pángong lake, where it flew up and down the stream in flocks of several hundred individuals, uttering all the time a cry like “Yak, yak.” It was very tame; and a great many were shot and, unfortunately, eaten.

Lieut. Prjevalsky (*l. c.*) first met with this Sand-Grouse in the Kokonor steppes in flocks of from ten to thirty, but in Northern Tibet saw it in flocks of about a hundred individuals. They were generally on the sandy plains, and fed on the seeds of various grasses and beans. When so engaged they could be approached quite close, and seldom flew above a hundred yards before settling again,

even when shot at. When flying they utter a note like "*caga, caga*," and on the ground run clumsily and slowly, generally forming a line. In Northern Tibet they were frequently heard flying about at night; but no cause could be found to account for this strange behaviour. The Kokonor basin, according to Prjevalsky, forms the northern and probably also the eastern limit of its geographical distribution.

Male. Head and back of neck barred alternately with black and white, chin and front yellowish white. Sides of neck and throat orange-yellow. Breast buffy white, barred irregularly with brownish black. Upper part of back and wings buff, lower part of back and rump buffy white; all the feathers minutely mottled with black, hardly perceptible on the wings. Inner webs of scapulars black. Primaries and secondaries brownish black; the fourth to eighth primary brownish white at the tip, mostly on the inner web. Median rectrices like the back, lengthened and filamentous, their apical half black; lateral feathers reddish buff, barred with black, and tipped with white. Under surface white; under tail-coverts reddish buff, barred with black and tipped with white. Legs and feet covered with buffy-white feathers; bill and nails black.

Total length $15\frac{1}{2}$ inches, wing 10, tail $7\frac{1}{2}$, bill along gape $\frac{1}{2}$.

4. Descriptions of nineteen new Species of Diurnal Lepidoptera from Central America. By F. DuCANE GODMAN and OSBERT SALVIN.

[Received Jan. 18, 1878.]

Nearly half of the species described in this paper have been sent us during the past year by Mr. H. Rogers from Costa Rica, where he has been collecting on the slopes of the volcano of Irazu. The rest of the species are selected from unnamed specimens in our collection, some of them from Guatemala and some from Mexico. Figures of most of them have been prepared and will be published shortly. Specimens of all the species are in our collection.

SATYRIDÆ.

1. EUPTYCHIA PHILODICE.

♂. Exp. 1.9 in. Margin entire, anal angle of secondaries slightly produced; rich brown, central portion of the primaries slightly paler, middle of the secondaries rich reddish fulvous with a very distinct tawny-yellow patch, the inner edge slightly sinuate, the outer extending to two black submarginal spots between the radial nervules; a third nearly obsolete black spot between the median branches: beneath reddish brown, a dark band crossing both wings through the middle of the cell of each, strongly sinuate on the secondaries; beyond the cell of the primaries are two subparallel transverse bands including towards the inner margin a tawny yellow band; a conspicuous tawny yellow band crosses the secondaries

beyond the cell, five argenteous spots surround the margin of the secondaries, whereof those between the lower radial nervule and the third and second median branches are the pupils of black ocelli; that between the first and second median branches is sagittate.

♀. Exp. 1·95. Similar to the male, the colour somewhat paler and the wings more rounded.

Hab. Costa Rica, Irazu (*H. Rogers*).

Obs. This well-marked species belongs to the *E.-phocion* group of the genus (*cf.* Butler, Journ. L. S. Zool. xiii. p. 123), and comes next *E. argentella* and *E. pyracmon*, having the wings similarly shaped. The peculiar tawny-yellow marks of the secondaries render the species very distinct from its allies. This marking on the upper surface is subject to some variation, being more restricted in some specimens and divided by the reddish brown of the inner portion of these wings running through it longitudinally. Mr. Rogers has sent us a good series of this fine species.

2. EUPTYCHIA ROGERSI.

♂. Exp. 1·9. Form as in *E. argentella*: uniform brown above, with a single conspicuous black spot near the margin of the secondaries, between the third median branch and lower radial nervule: beneath paler, a dark red-brown sinuate band crosses both wings through the cell of each; another, nearly straight on the primaries, sinuate on the secondaries, also crosses both wings beyond the cell, outside of which is a pale-brown common band margined exteriorly by a red-brown band hardly traceable on the secondaries; two argenteous spots near the apical angle of the secondaries, and an elongated submarginal one between the first and second median branches; a conspicuous ocellus corresponding to the black spot of the upper surface, the outer ring of which is fawn-yellow, and in the black pupil is a concentric silver spot.

♀. Exp. 1·9. Similar to the male but rather paler and the wings more rounded; the dark bands of the underside appear as indistinct reddish bands on the upper surface.

Hab. Costa Rica, Irazu (*H. Rogers*).

This species also belongs to the *E.-phocion* group of the genus. The presence of a single black submarginal spot on the secondaries, as well as other characters, distinguishes it from its allies *E. argentella*, *E. pyracmon*, and *E. philodice*.

3. EUPTYCHIA VETONES.

♂. Exp. 1·8 in. Primaries slightly falcate; outer margin of secondaries sinuate, most produced at the end of the second median branch: uniform brown above: beneath brown mottled with paler scales; an obscure narrow band crosses the cell of both wings; a broad submarginal pale reddish-brown band, expanding towards the outer margin, on the primaries; a distinct, yellowish, narrow, nearly straight band traverses the secondaries from inside the apical to inside the anal angle; a distinct ocellus with an argenteous crescent

inside between the second and third median branches ; argenteous spots on either side of this ocellus.

♀. Exp. 1.95 in. Like the male, but the upperside crossed with reddish bands corresponding to the markings of the underside ; the ocellus of the underside shows above as an indistinct black spot.

Hab. Costa Rica, Irazu (*H. Rogers*).

Obs. A close ally of *E. ithama*, Butler (Lep. Ex. p. 9, t. iv. f. 4), from which it differs in the much clearer definition of the markings of the underside, the extracellular transverse cross band of the secondaries being yellowish and not reddish as in *E. ithama*. The male of *E. ithama* is not known to us ; but, comparing the females of the two species, the red markings of the upper surface of the southern race are much more conspicuous than in the northern. Mr. Butler's figure of *E. ithama* (the type of the species being before us) is much too pale in general tint, and the cross bands far too conspicuously shown.

4. LYMANOPODA EUOPIS.

♂. Exp. 2.2 in. Primaries with apical angle rather pointed, outer margin of secondaries rounded ; rich brownish-black ; black ocelli with white pupils between the radial nervules and the second and third median branches, halfway between the cell and the outer margin ; a transverse row of obsolete black spots beyond the cell of the secondaries : beneath reddish-brown, yellowish beyond the cell ; a bicurved row of five distinct black ocelli with white pupils between the cell and the outer margin of the primaries, on either side of this row a sinuate black band, the distal one reddish towards the apical angle ; at the end of the cell a dusky yellowish spot surrounded by a black line : secondaries beneath with dark red-brown bands from costal margin across the cell, and beyond the cell from the third median branch to the inner margin ; a submarginal band made up of outwardly concave concentric marks ; across the wing beyond the cell runs a band of seven small white-pupillated black ocelli, each on a patch of rich red-brown.

♀. Exp. 2.22 in. Brown ; primaries with six black white-pupillated ocelli arranged in a double curve beyond the cell on a tawny-yellow ground ; secondaries with distal half (except the margin) tawny-yellow, a band of six black spots crosses the wings beyond the cell : beneath tawny-yellow, the base of the primaries rather darker, ocelli and markings of primaries as in the male ; secondaries almost uniform tawny-yellow, the ocelli and markings almost obsolete.

Hab. Costa Rica, Irazu (*H. Rogers*).

Obs. A very distinct species of this Andean genus, the first as yet found north of the Isthmus of Panama.

5. PEDALIODES TRIARIA.

♂. Exp. 2.45 in. Allied to *P. praxithea* (Hew. Ex. Butt. *Pronophila*, pl. v. f. 28, 29), differing in the more pointed primaries ; the orange band of the same wings is narrower and of nearly equal width ; in the secondaries the orange spot, instead of being restricted

to the apical angle, extends halfway along the outer margin. Beneath the difference between the two species is more obvious; the whole under surface of the secondaries in *P. triaria* is dark brown mottled with black, two broken black bands crossing the wings, one through the cell, the other beyond it; a row of six submarginal ocelli with white pupils, that between the first and second median branch being much the largest and most conspicuous; the mottling of the apical area of the secondaries is upon a yellowish ground-colour; the light ground-colour at this part, and over the distal third of the secondaries in *P. praxithea* is wanting.

Hab. Costa Rica, Irazu (*H. Rogers*).

6. PEDALIODES CREMERA.

♀. Exp. 2.9 in. Primaries entire, apical angle somewhat produced, outer margin of secondaries sinuated; dark brown; primaries crossed by a broad submarginal band of obscure tawny, the inner edge of which is concave, and the outer serrate running parallel to the outer margin: beneath mottled with blackish brown, in the tawny band of the primaries, between the first and second median branches is a white-pupillated ocellus; an irregular dark line follows the outer margin of the secondaries halfway between the outer margin and the cell; between the first and second median branches near the margin is a large black ocellus with a white pupil, and two smaller ones near the anal angle.

Hab. Costa Rica, Irazu (*H. Rogers*).

7. OXEOSCHISTUS ROGERSI, sp. n.

♀. Exp. 3 in. Allied to *O. phaselis* (Hew.), differing above in having a conspicuous row of tawny oval spots, separated by the nervules running parallel to the outer margin, the three spots separated by the first and second median branches, and that between the middle and upper radials bearing large dark brown spots of the same brown colour as the rest of the wings: beneath, the markings resemble those of *O. phaselis*, except that the marginal region of the primaries is strongly marked with fulvous corresponding with the markings of the upper surface.

Hab. Costa Rica, Irazu (*H. Rogers*, type *mus. nostr.*); Chiriqui (*Ribbe*: *mus.* O. Staudinger).

Dr. Staudinger's Chiriqui specimen exactly resembles ours, except that it is rather paler, being not so fresh.

O. phaselis has been placed in the genus *Pronophila* by Mr. Hewitson, and in that of *Dædalma* by Mr. Butler (Cat. Satyr. p. 184); but, so far as we can see, its proper place is in the genus *Oxeoschistus*, with the members of which it agrees in neuration, and with some of them in style of coloration.

NYMPHALIDÆ.

8. PHYCIODES THEBAIS, sp. n.

Exp. 1.5 in. Allied to *P. orseis*, Edwards, ex California, as to the position of the marks of the upper surface, and as to the coloration of

the under surface of the wings: the markings above are pale yellowish instead of deep fulvous, and the submarginal row of ocelli of the secondaries is almost obsolete; the outer margin of the primaries is more sinuate, being slightly concave about the middle, instead of following a simple convex outline: beneath the dark marks near the outer margin and inner angle of the primaries are more clearly defined.

Hab. Mexico, Mountains of Oaxaca (*Fenocchio*, type); Guatemala, Highlands near Dueñas, 4800 ft. (*S. & G.*).

Mus. nostr. Two examples.

9. *PHYCIODES BOUCARDI*, sp. n.

Exp. 1.3 in. Form of *P. elada* (Hew.), which it somewhat resembles on the upperside, but from which it differs completely on the underside. The tawny spots are all of nearly equal size, that halfway between the end of the cell and the apex of the primaries (divided into three by the nervules) being slightly the largest. The spots on the secondaries beyond the cell are arranged in three concentric lines, the submarginal one consisting of a series of lunules, the middle one consisting towards the anal angle of obsolete ocelli. Beneath nearly uniform tawny, the secondaries being paler; the basal two thirds of both wings crossed irregularly with fine dark lines; the outer third of the primaries submarginally dark, enclosing round tawny spots; secondaries with a dark patch about the middle of the outer margin, and a row of black spots corresponding to the obsolete ocelli of the upperside.

Hab. Mexico, Putla (*Rébouch*).

Mus. nostr. One example.

We are indebted to Mr. Boucard for the possession of this species.

10. *PHYCIODES SUBOTA*, sp. n.

♂. Exp. 1.7 in. Allied to *P. ardys* (Hew.), from which it differs on the upperside in the submarginal lunate lines of the secondaries being obsolete, and in having the bases of both wings without the faint marking seen in *P. ardys*. Beneath, the deep-tawny spots and pale fulvous wash are replaced by deep brown and pinkish grey; a well-defined band of pale spots crosses the middle of the secondaries.

♀. Exp. 1.95 in. Similar to the ♂, but larger, and all the marks, especially the band crossing the secondaries, better-defined.

Hab. Guatemala, valley of the Rio Polochic (*S. & G.*); Costa Rica, Irazu (*Rogers*).

Mus. nostr.

The Costa-Rica specimens are slightly aberrant, the base of the wings beneath being darker and the cross band of the secondaries narrower.

11. *PHYCIODES DRYMÆA*, sp. n.

♂. 1.4 in. Allied to *P. ardys*, Hew., and the last-described

species; from both it differs in the absence of the band crossing the secondaries, its place being occupied by a row of very small spots: beneath, the markings of the secondaries are very indistinct, and consist chiefly of dark marks near the region of the anal angle, and one projected from beyond the middle of the costa halfway across the wing.

Hab. Guatemala; hacienda "las Nubes;" valleys of the rivers Chisoy and Polochic.

Mus. nostr.

12. PHYCIODES CYNEAS, sp. n.

♂. Exp. 1.45 in. Allied to *P. leanira*, Feld., ex California, from which it differs in having a well-defined submarginal row of red spots on the secondaries above, and also some red spots near the middle of the outer margin of the primaries, but none on the inner part of the wing: beneath, the dark markings of *P. leanira* across the cell and towards the costa of the secondaries are wanting; but, as in that species, the nervules are black.

Hab. Mexico, mountains of Oaxaca (*Fenocchio*).

Mus. nostr.

13. PHYCIODES NEBULOSA.

♂. Exp. 1.5 in. Belongs to the *P.-ardys* (Hew.) group. Markings of wings above deep tawny red; wings more elongated than in *P. ardys* and its allies; base of the secondaries with obsolete tawny marks; secondaries beneath pale greyish, region of the outer margin dark, and a dark subtriangular mark from the costa halfway across the wing.

Hab. Guatemala, hacienda "las Nubes" (O. S.).

Mus. nostr.

Taken in the beginning of February 1874.

14. ERESIA MECHANITIS, sp. n.

♀. Exp. 2.2 in. Like *E. eunice* (Hübner), but differing in having the apical half of the primaries crossed with two well-defined yellowish bands: the inner one is but slightly indented and not distinctly broken as in *E. eunice*; the outer one crosses the apex as a distinct band instead of being an obsolete spot.

Hab. Nicaragua (*Janson*).

Probably a northern race of *E. eunice*, but differing slightly from all the forms of that species found in the Amazonian region.

15. ERESIA DRYPETIS, sp. n.

♂. Exp. 2.2 in. Differs from *E. eunice* and the last-described species chiefly in the narrowness and direction of the transverse band of the secondaries. The dark mark over the median nervure of the primaries is obsolete; the dark band crossing the primaries is continuous.

Hab. Panama (*McLeannan*, type); Guatemala, interior (S. & G.).

16. *TIMETES PHIALE*, sp. n.

♂. Exp. 2.5 in. Closely allied to *T. corita*, Bates, from which species the male hardly differs: the region of the costa of the secondaries is suffused with the reddish tawny colour of the apical angle; and beneath the general tint is paler.

♀. Exp. 2.5 in. Differs from ♀ *T. corita* in general tint of the wings being brick-red instead of rich brown, the transverse markings of the wings being much more clearly defined; beneath the markings are all very indistinct, both wings being crossed by a common rufous band.

Hab. Guatemala, Volcano of Atitlan (*Salvin*).

Mus. nostr. Three examples.

Taken at the end of January 1874, in forest, at an elevation of about 4000 feet.

17. *ADELPHA FALCATA*, sp. n.

♂. Exp. 2.2 in. Primaries elongated, outer margins concave, dark brown; both wings with a common white band extending from the space above the second median branch of the primaries to the anal angle of the secondaries, where the usual tawny spot is absent. A tawny spot extends curving outwards from about the middle of the distal half of the subcostal nervure of the primaries towards the margin; the outer margin of this spot is deeply sinuated, apex narrowly white. Beneath rich tawny; the white band as above, but with a dark margin on either side; the tawny spot is paler and rounded; a submarginal row of glaucous spots, obsolete about the middle of the margin of the primaries; two glaucous spots in the cell and one beyond it; two transverse series across the base of the secondaries, all with dark margins.

♀. Similar to the ♂, but larger (exp. 2.55 in.); the primaries being less falcate.

Hab. Guatemala, valley of the Rio Polochic.

Mus. nostr.

Obs. In pattern of coloration this species somewhat resembles *A. iphiclea* (L.); but it may be at once distinguished by the strongly falcate wings, the absence of the tawny spot at the anal angle of the secondaries, and the coloration of the under surface.

18. *ADELPHA DIOCLES*, p. n.

♂. Exp. 2.1 in. Dark brown, with three darker submarginal bands to both wings; a common white band crosses both wings from above the second branch of the median nervure of the primaries to the anal angle, near which is a tawny spot; a tawny spot runs from the costa of the primaries, parallel to the margin, nearly as far as the first median branch, and is separated from the white band by an oblique dark line; two dark-margined tawny spots cross the cell, one at the end and one in the middle. Beneath the bands are as on the upperside; the margins of both wings are bluish white, with a marginal and central tawny line; this marginal band is separated from

the central bands by a tawny dark-edged band ; the cell of the primaries is whitish at the base and crossed by a dark-margined spot of the same colour near the end ; beyond it is a similar mark running into the central white band.

Hab. Volcano of Chiriqui (*Arcé*).

Mus. nostr.

A beautiful and distinct species, coming perhaps nearest *A. syma* (Hübner) of S. Brazil.

PAPILIONIDÆ.

19. *PAPILIO SYEDRA*, sp. n.

♂. Exp. 5 in. Allied to *P. abderus*, Hopff., and *P. asclepius*, Hübner., the yellow submarginal lunules of the secondaries being absent as in the former of these two species. From it the present species differs in the row of black lunules which traverse the secondaries beneath, beyond the yellow band, being distinctly margined on their inner convex edges with maroon, the outer concave edges enclosing an area of blue ; these marks in *P. abderus* are respectively grey and yellow : the submarginal lunules beneath on the secondaries are deeper maroon than in *P. abderus*.

Hab. Volcano of Chiriqui (*Arcé* & *Ribbe*).

Mus. nostr. et O. Staudinger.

We have long possessed a single specimen of this species. Having recently seen others in the collection of Dr. Staudinger, we have been able to test the stability of the characters by which it differs from *P. abderus*.

5. On a small Collection of Birds from the Ellice Islands.

By R. BOWDLER SHARPE, F.L.S., F.Z.S., &c. With a Note on other Birds found there, by the Rev. S. J. WHITMEE.

[Received January 21, 1878.]

The Rev. S. J. Whitmee has been so kind as to submit to me a small parcel of birds obtained for him by a collector in the Ellice Islands. The few skins do not give materials for a large paper ; but I trust that the details connected with the synonymy of *Anous cæruleus* will be found interesting.

1. *ARDEA SACRA*, Gm. ; Finsch & Hartl. Faun. Central-Polyn. p. 201 (1867).

Two specimens in changing plumage, one with the white dress nearly complete, the other still with plentiful remains of ashy-brown feathers.

2. *ANOUS CÆRULEUS*.

I must acknowledge the assistance which I have received from Mr.

Howard Saunders's paper on the Sterninæ in the 'Proceedings of this Society for 1876; and it is solely through want of material that he was unable to discriminate the two Grey Noddies of the Pacific, as I am able to do from the receipt of the present specimens.

Two examples are in the collection now sent; and I saw at once that they belonged to a different species from the bird marked as *A. cæruleus* in the national collection. The following is a description of one of these specimens:—

Suprà cinereus, alis caudâque quam dorsum vix saturatioribus: primariis duobus externis extûs magis nigricantibus: pileo colloque undique puriùs canis, fronte et facie anticâ albicantibus: maculâ parvâ anteculari nigrâ: corpore reliquo subtùs cinereo, subalaribus externis et margine alari canescentibus: rostro nigro.

Long. tota 9·3, rostri a fronte 0·95, alæ 6·6, caudæ 2·75, rectricis penultimæ 3·85, tarsi 0·9.

It appears that this small species is unquestionably the true *Sterna cærulea* of Bennett, and that Mr. Gould was perfectly right when he separated the North-Australian bird as *Anous cinereus*, and that he was wrong in sinking this name, published in 1845, in favour of Néboux's, which was not published until 1846. The following appears to be the true synonymy of the two species.

ANOUS CÆRULEUS.

Sterna cærulea, F. D. Bennett, Narr. of a Whaling Voyage, ii. App. p. 248 (1840).

Sterna cendré, Néboux, Rev. Zool. 1840, p. 291.

Sterna tereticollis, Lafr. Rev. Zool. 1841, p. 242.

Procelsterna tereticollis, Lafr. Mag. de Zool. 1842, pl. 29.

Anous parvulus, Gould, P. Z. S. 1845, p. 104; Cassin, U.S. Expl. Exp. Birds, p. 393 (1858); Gray, Cat. B. Pacific Isl. p. 60 (1859).

Anous gracilis, Gray, Gen. B. iii. p. 661 (1846, lapsu).

Stolida cinerea, Néboux, Voy. Vénus, Atlas, pl. 9 (1846, nec Gould).

Megaloptyx plumbeus, Peale, U.S. Expl. Exp. p. 285 (1848).

Anous cinereus, Prévost et Des Murs, Voy. Vénus, v. p. 276 (1855); Finsch & Hartl. Faun. Central-Polyn. p. 239, taf. xiii. fig. 4, taf. iv. figs. 4 & 5 (1867).

Procelsterna cinerea, Bp. C. R. xlii. p. 773 (1856).

Anous cinerea, Gray, Hand-l. iii. p. 123. no. 11088 (1871).

Diagn.: *Minor, schistaceo-cinereus, pileo et corpore subtùs toto vix pallidiùs cinereis; secundariis externis angustissimè ad apicem albo limbatis; subalaribus schistaceo-cinereis.*

Hab. in insulis orientalibus maris Pacifici.

ANOUS CINEREUS.

Pelecanopus pelecانoides, Gray, List of Anseres, p. 180 (1844).

Anous cinereus, Gould, P. Z. S. 1845, p. 104; id. B. Austr. fol. pl. 46 (1848); Reichenb. Vög. Neuholl. p. 181. no. 536 (1850).

Anous tereticollis, Gray, Gen. B. iii. p. 661 (1846).

Procelsterna albivitta, Bp. C. R. xlii. p. 773 (1856); Gould, Handb. B. Austr. ii. p. 420 (1865).

Sterna cinerea, Schleg. Mus. P.-B. *Sternæ*, p. 38 (1863).

Anous albivitta, Gray, Handl. B. iii. p. 123, no. 11089 (1871).

Anous cæruleus, Saunders, P. Z. S. 1876, p. 671 (*nec* Bennett).

Diagn.: *Major, suprâ cinereus; pileo et collo undique et corpore subtùs toto albicanti-cinereis; secundariis conspicuè albo terminatis; subalaribus albis.*

Hab. In Australiâ septentrionali et orientali usque ad insulas Pacificas 'Friendly' dictas.

Dr. Finsch, in his paper read before the Society on the 20th of November last, records this species from Eua in the Friendly group. He recognizes the distinctness of the two species; but there is no need to restore the name of *Anous albivitta*, as the title *cinereus* was given by Gould in 1845, and Néboux's *A. cinereus* was not published till 1846.

3. *ANOUS STOLIDUS* (L.); Saunders, P. Z. S. 1876, p. 669.

Two specimens.

4. *ANOUS LEUCOCAPILLUS*, Gould; Saunders, P. Z. S. 1876, p. 670.

A single example of a Noddy apparently referable to this species.

5. *STERNA ANÆSTHETA* (Scop.); Saunders, P. Z. S. 1876, p. 664.

One specimen.

6. *GYGIS CANDIDA* (Gm.); Saunders, P. Z. S. 1876, p. 667.

One specimen.

Besides the above-named species there are some eggs, two of a Noddy Tern, sent with the skins of *Anous stolidus* and *A. leucocapillus* and probably belonging to the former, and three eggs apparently of a Duck. In one box were also two wings of a small Parrot.

Note on the preceding Communication. By the Rev. S. J. WHITMEE, F.R.G.S., C.M.Z.S.

During 1876 Mr. Fritz Jansen, a Danish Botanical student who had been residing with me in Samoa for a year, collecting the flora of those islands, went on a cruise through several groups of islands to collect for me the flora and as much as possible of the fauna existing there. In addition to the birds included in the foregoing list, he saw a *Carpophaga* in the Ellice Islands; and the Frigate-bird (*Fregata aquila*) also occurs there. In fact, the latter bird is domesticated by the natives; and when I was in those islands in 1870 I saw scores of them about the villages sitting on long perches erected for

them near the beach. The natives procure the young birds and tie them by the leg and feed them till they are tame. Afterwards they let them loose, and they go out to sea to get their food, and return to their perches in the villages at intervals.

I cannot say to what species the *Carpophaga* is referable, not having seen it myself. Mr. Jansen procured young ones in May and June; but he, thinking they were the same as the Pigeon found in Samoa (*C. pacifica*), did not preserve any specimens. Natives of the Ellice Islands who were in Samoa when I left there, told me their pigeon is like the Samoan species, "except that it is smaller, owing to its food being less plentiful." That is their own explanation of the cause of difference. They say it feeds almost entirely on the fruit of the native fig (*Ficus*, sp.). They also tell me it is not gregarious in those small islands as it is in Samoa during part of the year. As far as they know it does not migrate, but may always be found sparsely distributed over the islands.

So far as I have been able to learn, no Pigeon occurs in the Gilbert Islands; but a *Carpophaga* occurs in the Union or Tokelau Islands. Mr. Jansen tells me that all the birds he procured in the Ellice Islands, which are included in the foregoing list, are found also in the Union Islands. This may probably be considered nearly a complete list of the avifauna of those small atolls.

6. Note on the Dentition of *Cuscus*.

By EDWARD R. ALSTON, F.L.S., F.Z.S., &c.

[Received January 25, 1878.]

In reporting last year on the Rev. G. Brown's collection from New Ireland and the vicinity¹, I observed that the two specimens of *Cuscus* contained in it differed from the characters usually given of *C. orientalis* in having but two small teeth behind the large lower incisors, and in wanting the small extra upper premolar. At the same time I corroborated Mr. Waterhouse's remark² that the number of functionless teeth is not always trustworthy in this group, and observed that it must be left to future investigation to show whether the New-Ireland Phalangers were or were not constant in the peculiarity of their teeth.

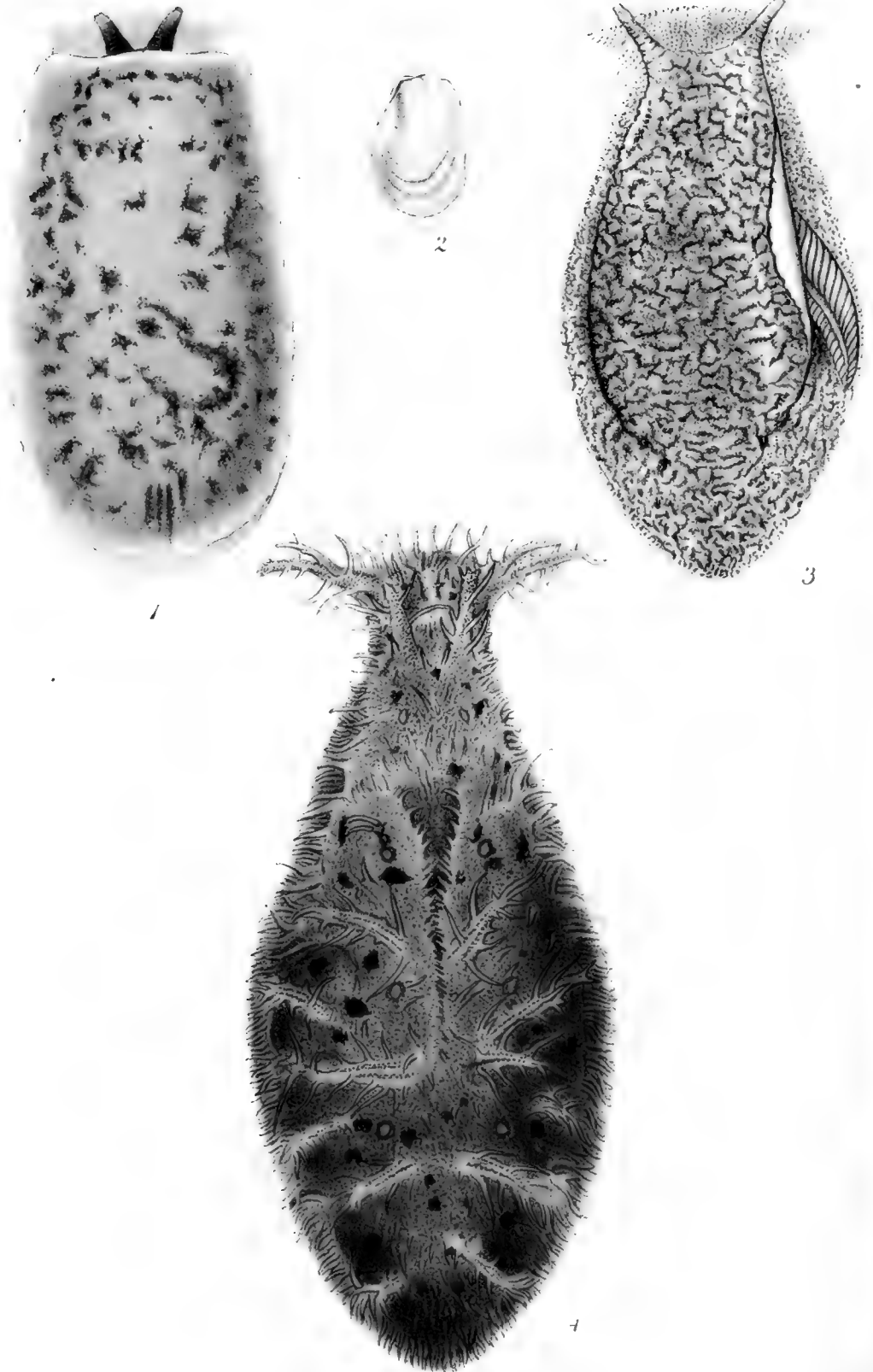
Mr. Sclater has now kindly placed in my hands a second small collection received from Mr. Brown, consisting of one example of *Mus browni*, Alst., one of *Uromys rufescens*, Alst., ten of *Belideus ariel*, Gould, and eight of *Cuscus orientalis*, Pall. All these species were represented in Mr. Brown's former consignment; but the series of the last-named now available enables me to decide the question as to its dentition.

In *four* of these eight specimens the extra upper premolar is

¹ P. Z. S. 1877, p. 126.

² Nat. Hist. Mamm. i. p. 265.





J. Smit lith

Hanbart sculp

NEW OPISTHO-BRANCHIATE MOLLUSCA

present, being in one case nearly as large as the constant first premolar, while in another it is a mere rudiment; in the other *four* examples it is altogether absent. In the number of the functionless teeth of the lower jaw (which I carelessly called small incisors in my previous paper, but which Professor Owen regards as the homologues of the canines and anterior premolars¹) there is the greatest possible variety, one example having *three* in one ramus and *none* at all in the other; three, however, appears to be the normal number. These differences have nothing to do with the age of the individual; for the extra upper premolar is absent in a half-grown animal, and the small lower teeth are present in one of evidently great age.

It appears, therefore, that the dentition of this genus is even more variable than has been believed, and that the existence of the additional teeth must be dropped from the specific characters of *C. orientalis*. I may add that in several of these specimens, which are all females, the dark dorsal stripe is absent; this also has been regarded as a diagnostic character.

7. Descriptions of three new Species of Opisthobranchiate Mollusca from New Zealand. By S. T. CHEESEMAM, F.L.S., Curator of the Auckland Museum.

[Received January 29, 1878.]

(Plate XV.)

From a number of new species of Opisthobranchiate Mollusca collected in or near Auckland Harbour I have selected for description the three following prominent forms.

1. *PLEUROBRANCHUS ORNATUS*, n. sp. (Plate XV. figs. 1, 2.)

Body 3-4 inches long, broadly elliptical, depressed, nearly equally rounded at both ends, colour varying from pale buff to a clear reddish brown, with irregularly disposed blotches of a rich dark red-brown; mantle large, extending over and concealing both head and foot, quite smooth, margin thin, entire; dorsal tentacles short, stout, abruptly truncate, finely transversely wrinkled, approximate at their origin, but gradually diverging at their apices; colour reddish brown tipped with white; eye-specks black, placed a little distance behind the tentacles, embedded in the integument, but appearing through it; oral tentacles united in front by a thin semi-circular expansion which forms a veil concealing the mouth, and which is carried in advance of the foot; mouth roundish, with fleshy lips; buccal plates two, regularly reticulated; odontophore with numerous rows of similar unciform teeth. Branchial plume placed in the groove between the foot and the mantle, very large,

¹ Odontography, i. p. 382.

composed of about 22–24 pectinations; foot oblong, thin and flexible, pale waxy white.

Shell internal, $\frac{1}{2}$ to $\frac{3}{4}$ inch long, squarish oblong, thin and membranous, semitransparent, slightly iridescent, closely marked with somewhat irregular concentric striæ or folds; colour varying from nearly white to pale pinkish or tawny brown. Spire minute, obscure, mouth occupying the whole of the undersurface.

My first specimens of this handsome species were obtained from under stones between tide-marks in Auckland Harbour; where, however, it is by no means common. Near Waiwera and in some other localities on the Hauraki Gulf it is much more frequently met with. It is easily kept alive in an aquarium, but is very sluggish in its movements.

2. *PLEUROBRANCHÆA NOVÆ-ZEALANDIÆ*, n. sp. (Plate XV. fig. 3.)

Body oval, convex, thick and fleshy, smooth and lubricous to the touch, but the whole surface nevertheless covered with minute puckers and folds. Colour light grey, copiously streaked with irregular anastomosing lines of dark greyish-brown, and sprinkled with numerous minute and almost microscopic white dots. Mantle smooth, not nearly so long as the foot, and not concealing the branchiæ, rather broader on the right side; oral veil broad, extending over and concealing the mouth, in front semicircular, and with a delicate fringed margin, but at each side produced into a short tentacle-like lobe; mouth large, round, in a state of rest concealed in the sulcus between the oral veil and the foot, but capable of being greatly protruded in a proboscidiiform manner; buccal plates two, large, finely and regularly reticulated or faceted; odontophore broad, with numerous rows of similar unciform teeth; tentacles dorsal, wide apart, short and stout, projecting outwards, folded down the outer side, tips obliquely truncate; eyes minute, black, placed within the integument at the inner bases of the tentacles, quite internal, and not to be seen without dissection; foot long, extremely flexible, sole pale ashy grey; branchial plume often over an inch in length, and free for half that distance; pectinations about 17, finely ciliated; shell none; length 2·5 to 3·25 inches.

This species is very abundant in Auckland Harbour, usually affecting sandy or muddy localities. In the winter and spring months large numbers are often exposed at neap tides, having probably come into shallow water to deposit their ova. Capt. Hutton, of the Otago Museum, informs me that he has collected the same species at Port Nicholson. It is hardy and not easily killed, and may be kept in confinement for a long time. When in a healthy state it is by no means inactive, crawling along by means of its muscular foot much more quickly than might be expected. It has a curious habit of floating in a reversed position, just under the surface of the water; and I have also observed it swimming by means of rather violent vertical undulations of its body.

3. *ACLESIA GLAUCA*, n. sp. (Plate XV. fig. 4.)

Body from 3 to 5 inches long, about ovate when at rest, but capable of considerable extension, a little contracted behind the head, then elevated, and suddenly sloping to a point posteriorly; entirely covered with numerous simple and branched tentacle-like processes, the largest of which are sometimes eight lines long. Colour on the sides pale greyish-brown, passing on the back into a dull sea-green; the whole surface with numerous irregularly shaped black blotches that are longest on the back. Along the back there is also a double row of from 8 to 12 emerald-green specks, each surrounded with a zone of umber. Dorsal tentacles $\frac{3}{4}$ inch long, folded down the outer side so as to appear tubular, beset with filiform appendages. Labial tentacles similar in shape, but rather larger. Branchial cavity large, protected by the folded-in edges of the mantle, branchiæ quite internal; foot long and narrow, pointed behind, without side-lobes as in *Aplysia*, sole pale sea-green; mouth roundish, placed under the head; odontophore with very numerous rows of simple hooked teeth; gizzard strengthened with large triangular calcareous plates; shell none.

Like many of the species of the allied genus *Aplysia*, this animal possesses the power of emitting a purple fluid from the edges of the mantle, but only in small quantity; and it may often be handled without any thing of the kind being observed. All my specimens are from Auckland Harbour, and were obtained from rather sandy localities near the extreme verge of low-water mark.

EXPLANATION OF PLATE XV.

- Fig. 1. *Pleurobranchus ornatus*.
- 2. Shell of the same.
- 3. *Pleurobranchæa novæ-zealandiæ*.
- 4. *Aclesia glauca*.

8. On a new Species of the Genus *Buceros*. By ARTHUR, Marquis of TWEEDDALE, F.R.S., President of the Society.

[Received February 2, 1878.]

In a collection of birds made at Amparo (in the extreme south of the Philippine island of Leyte), and sent to me by Mr. Everett, are some examples of a Hornbill of the genus *Buceros*, which differ from the two other known Philippine species¹ sufficiently to require description. The characters which differentiate the large *Buceros* of Mindanao, *B. mindanensis*, from the one which inhabits Luzon were stated some months ago before this Society (see P. Z. S. 1877, 543). But in those two species the form and general contour of the bill and casque are alike, whereas in this second representative form of *B. hydrocorax* the form of the casque is very different. The colouring of the bill resembles that of *B. mindanensis*; and in

¹ *B. hydrocorax* and *B. mindanensis*.

the general colouring of the plumage there is little or no difference. It is the form of the casque that provides the differential specific character. Instead of being produced forward as in *B. hydrocorax* and *B. mindanensis*, with an abrupt, compressed, and elevated anterior margin, the superior plane of the casque loses itself and dies away on the culmen. The superior plane of the casque is not flat but arched along its length, the crown of the arch during the course of its anterior half forming an almost acute ridge. In the

Fig. 1.

Side view of head of *Buceros mindanensis*.

Fig. 2.

Head of *Buceros mindanensis*, from above.

two known species the contour of the superior flat plane of the casque is that of an oval, the posterior end being rounded and the anterior pointed. In this Leyte species the posterior end is also rounded; but the sides, instead of gradually expanding to the greatest breadth of the superficial area and then gradually contracting to the apical point, continue in almost parallel lines for about two thirds of the length of the major axis of the casque, and then terminate abruptly, forming corners from which the sides of the remainder of the casque recede until they reach the culmen.

[S. Leyte, ♂ (adult), September. Iris light yellow; orbital skin darkest sepia, almost black; gular skin dark Indian-yellow; feet coral-red; nails dark brown-grey.—*Everett*.]

The iris of an adult male from the island of Panaon is recorded by Mr. Everett as being "pale blue."

Distinct slightly corrugated basal plates are present on the walls of the mandibles of the adult birds.

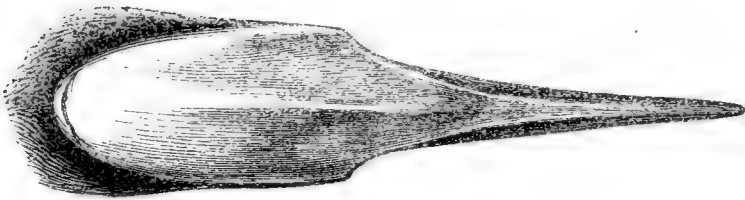
The first plumage has little resemblance to that of maturity. The space between the rami of the mandible and the patch at the base of the sides of the mandible is dirty brown. The head, neck, breast,

Fig. 3.



Side view of head of *Buceros semigaleatus*.

Fig. 4.



Head of *Buceros semigaleatus*, from above.

and abdomen are dirty greyish fulvous-white, the feathers of the head, neck, and upper breast being ferruginous at their insertions and grey at their tips; and such is the character of the thigh-coverts and ventral plumage. The upper tail-coverts are also dirty greyish-fulvous white, with either brown or ferruginous bases. The dorsal plumage and the quills and other wing-feathers are brown, the quills dark brown, with broad terminal dirty greyish-fulvous white marks or edgings. The middle pair of rectrices are for two thirds of their length pale brown, the apical third being white or dirty creamy white. All the other rectrices have the basal part to a greater or less extent pale brown, or pale rusty-brown. In some, probably the new feathers, the whole rectrix is white. In the plumage described

the bill is black with a yellow tip, and the casque is not formed. The colouring of the soft parts of the young bird is noted by Mr. Everett as follows:—"S. Leyte, ♀, September. Iris dark brown; bill black; orbital skin greenish yellow; gular skin yellow; legs and feet dark orange. b. S. Leyte, ♀, October. Iris grey-brown; bill jet-black, tip orange; feet dull orange."

The bill remains black after the bird has assumed the completely mature plumage and after the casque is almost perfectly formed.

	Dimensions.				Casque.		
	Wing.	Tail.	Tarsus.	Bill from gape. in.	Length.	Breadth.	Sides.
	in.	in.	in.		in.	in.	in.
♂	15·80	15·00	2·20	5·85	4·90	2·00	3·35
♀	14·30	14·50	2·20	5·30	4·75	1·65	3·30
♂ juv.	14·50	14·00	2·20	5·20	4·80	1·40	0·00

For this Hornbill I propose the title of *Buceros semigaleatus*.

9. Contributions to the Ornithology of the Philippines.—

No. V. On the Collection made by Mr. A. H. Everett in the Island of Negros. By ARTHUR, Marquis of TWEEDDALE, F.R.S., President of the Society.

[Received January 30, 1878.]

Mr. Everett has been continuing his zoological researches in the Philippine Islands unremittingly, and, by the consignment of a collection of birds made during the month of August last in the neighbourhood of Nueva Valencia and Dumaguete, situated at the extreme south of Negros, has enabled me to continue these contributions to the ornithology of the archipelago.

"The southern extremity of Negros," Mr. Everett writes, "which is the most mountainous part of the island, and where I hoped to find accessible virgin forest, is simply one vast field of maize, sugar-cane, and hemp, perfectly cleared, even far up the steep sides of the mountains, and is a very poor district indeed for birds." Notwithstanding, Mr. Everett in the space of one month secured 56 distinct species, 24 of which are now recorded for the first time from Negros. Of these 24 there are 6 new to the Philippine area, 3 of which are new to science.

Species not hitherto known as being inhabitants of the Philippines:—

Collocalia francica.

Butalis latirostris.

Limosa aegocephala.

Dasycrotapha speciosa.

Zosterops nigrorum.

Macropygia eurycerca.

The last three are new species.

The exact habitat of one previously recorded Philippine bird has been determined by Mr. Everett,

Eudromias geoffroyi;

and there now remain 38 Philippine birds of which the precise habitat still continues undecided.

The number of species known to inhabit the island of Negros previous to the date of Mr. Everett's visit was about 59¹; and to this number he has added 24, and raised the total of known Negros species of birds to 83.

The remarkable species *Dasycrotapha speciosa*, a new type of Timeliine genus, and the discovery of a second Philippine species of *Collocalia* are the most interesting results of Mr. Everett's ornithological researches in Negros.

1. CACATUA HÆMATUROPYGIA (1).

[Valencia, ♂, August.]

2. TANYGNATHUS LUZONENSIS (3).

[Valencia, ♂, ♀, August.]

Of two examples (♂) shot in August, one has the crown and occiput blue, the other green; in both the uropygium is green.

3. LORICULUS REGULUS (6).

Loriculus regulus, Souancé; Rowley's Ornith. Misc. pt. vii. p. 238, pl.

[Dumaguete, ♂, ♀, August: bill orange-red; cere orange; feet lighter orange; claws black. ♀ (juv.), August: feet dirty ochre-yellow.]

The series consists of eight examples, four marked as belonging to males, and four to females.

The males are in the adult typical plumage of the species. Two of the females have the occiput faintly golden, and traces of the orange nuchal band. The two other females have the whole head green, and the crimson upper tail-coverts covering only half the length of the rectrices. No blue about the chin, cheeks, and throat.

The male, as figured by Keulemans (*l. c.*), only exhibits a red band across the throat, whereas the lower throat and breast possess a large orange-red plastron.

4. LIMNAËTUS PHILIPPENSIS (14).

[Valencia, ♀, August: iris pale brownish grey; bill black; lores and cere dull greenish; feet light dirty yellow; claws black.]

Pure white underneath, the thigh-coverts being very faintly barred

¹ Dr. Steere added 21 species to the 38 recorded by me (Tr. Z. S. ix. p. 252) as known from Negros. Dr. Steere collected partly in North Negros, and partly at Dumaguete in the South; but, from the general term "Negros" being frequently all that is given as the locality by Mr. Sharpe (Tr. L. S. 2nd Series, Zool. vol. i.), it is impossible in many cases to determine the exact part of the island in which Dr. Steere's specimens were obtained.

with irregular lines of pale fulvous. Head and neck pure white, a few feathers with brown terminal drops. Back brown, each feather narrowly margined with pale tawny rufous. Uropygium and upper tail-coverts pale earthy brown, some of the coverts tipped with pure white. Minor wing-coverts brown, edged with dirty white. Major coverts pale earthy brown, with paler margins and white terminal edges. Quills dark brown, more or less blotched with paler brown and white. Rectrices above rich brown, with five or six very narrow cross dark brown irregular bands, a broader dark brown subterminal band. Shafts pure white for three fourths of their length. Rectrices underneath albescent, the brown bands being more conspicuous than above.

Wing 15·20 inches, tail 12·00, tarsus 3·50, culmen 1·50. Nuchal crest-plumes dark brown, tipped with white; length 3·30.

5. *HALIASTUR INTERMEDIUS* (17).

[Valencia, ♀, August.]

In full plumage.

6. *MEROPS PHILIPPINUS* (35).

[Valencia, ♂, ♀, August. Dumaguete, ♀, August.]

The series (7) consists of examples ranging from first plumage to that of the almost adult. None are in full plumage.

7. *MEROPS BICOLOR* (36).

[Valencia, ♂, ♀, August.]

In a series of five examples, one is in perfect plumage, the remaining four represent different stages of immaturity.

8. *EURYSTOMUS ORIENTALIS* (37).

[Dumaguete, ♀, August.]

9. *ENTOMOBIA GULARIS* (44).

[Valencia, ♂, August. Dumaguete, ♀, August.]

10. *SAUROFATIS CHLORIS* (47).

[Valencia, ♀, August. Dumaguete, ♀, August.]

11. *XANTHOLÆMA ROSEA* (51).

[Valencia, ♂, August.]

12. *COLLOCALIA FRANCICA*.

Hirundo francica, Gm. S. N. i. p. 1017; Walden, Ibis, 1874, p. 132. no. 70.

[Valencia, ♂, ♀, August.]

Mr. Everett's researches enable me to make known the existence in the Philippines of a second species of *Collocalia*. He has sent five examples. Underneath they are mouse-grey; above fuliginous brown, faintly tinged with bottle-green. The wings and tail darker brown than the back, showing a greenish gloss on the new feathers.

I can find no character whereby to separate these Negros individuals from those inhabiting Malacca, the Andamans, Sikim, Ceylon, the Neilgherries, the Mauritius, and the Fiji Islands. Wing 4.50. Formerly (*l. c.*) I referred by implication *C. troglodytes* to the *C. francica* section of the genus; but a reexamination of a considerable series of *C. troglodytes* shows that it more properly belongs to the section of which true *C. esculenta* may be taken as being the type.

13. *CENTROCOCCYX VIRIDIS* (64).

[Valencia, ♂, August. Dumaguete, ♂, August.]

14. *PENELOPIDES PANINI* (68)?

[Valencia, ♀, August: iris dull chestnut-brown; orbital and other bare skin white faintly tinged bluish; bill brown with olive-green tinge; feet dark lead-grey with a faint greenish cast; nails black.]

The single example sent wears the dress of the mature female of *P. panini*; but the bill is smooth, without lateral plates, grooves, or casque. The upper tail-coverts are ferruginous and not black. It may belong to a distinct representative form.

15. *ARTAMUS LEUCORYNUS* (73).

[Dumaguete, ♂, ♀, August.]

16. *GRAUCALUS STRIATUS* (74).

[Dumaguete, ♂, August. Iris crimson. Valencia, ♀, August. Iris crimson; bill black; legs grey-black.]

Of four examples three (♂) have the throat and upper breast uniform slate-colour, the remainder of the lower plumage, the uropygium and upper tail-coverts being broadly banded with black and white. One example (marked ♀) differs by having the entire lower plumage banded with black and white.

17. *VOLVOCIVORA? CÆRULESCENS* (75)?

[Valencia, ♂, August: iris dark chocolate; bill black; legs blackish grey.]

A single example of a bird (marked ♂) which I provisionally refer to the above species is sent from Negros by Mr. Everett. It differs from every example in my series ex Luzon and Zebu in having a longer and larger bill, in being dark ashy grey above, without any dark brown almost black margins to the feathers, the uropygium and upper tail-coverts being of still paler grey, in being below pale grey and not dark iron-grey, in having the major wing-coverts pure white and the tertiary quills broadly margined with pure white, and in having the two outer pairs of rectrices broadly tipped with white and some of the other rectrices slightly white-tipped. The under tail-coverts are also almost pure white. The general dimensions are about equal in all. The adult males of *V. cærulescens* are jet black; the adult females are dark plumbeous grey (conf. P. Z. S. 1877, p. 759. no. 23), while this bird is pale-coloured. *V. cærulescens* is as

yet only known to inhabit Luzon and Zebu ; and this may possibly belong to a representative form. But as it may also be *V. cærulescens* in first plumage, I refrain from bestowing on it a distinct title.

18. *LALAGE DOMINICA* (76).

[Valencia and Dumaguete, ♂, ♀, August.]

19. *DICRURUS MIRABILIS* (81).

[Valencia, ♂, ♀, August.]

20. *PHILENTOMA ALBIVENTRIS*.

Philentoma albiventris, Sharpe, Tr. L. S. 2nd series, Zool. i. p. 325. no. 49, "Guimaras" (Nov. 16, 1876).

[Valencia, ♂, August.]

A single example is sent by Mr. Everett ; and it seems to belong to a species distinct from *P. cyaniceps*, and Mr. Sharpe appears to have been justified in separating it, notwithstanding the doubt he expresses (*l. c.*). Besides the lower breast and abdomen being pure white, the dimensions of the rectrices and wings, when compared with those of an adult Luzon male, are longer ; tail 4.12 as against 3.50 ; wing 3.25 as against 2.87. These, however, are larger dimensions than those given by Mr. Sharpe of his type.

21. *LEUCOCERCA NIGRITORQUIS* (83).

[Valencia, ♂, August. Dumaguete, ♀, August.]

22. *CYORNIS PHILIPPINENSIS*.

Cyornis philippinensis, Sharpe, Tr. L. S. 2nd series, Zool. i. p. 325.

[Valencia, ♂ (juv.), August : iris dark brown ; bill black ; legs bluish grey. Dumaguete, August.]

The young birds (of which a series of five are sent) have their plumage, with the exception of the remiges and rectrices, which are brown, washed with blue or greenish blue, marked with large pale rufous spots. In one the whole of the body-plumage is so marked ; in another the abdomen and throat are white ; in another several of the uniform blue dorsal feathers have come in, and the breast is turning to pure rufous. The throat-plumes are the last to change to the adult colouring, while full maturity is indicated by the intensity of the rufous on the throat and breast.

23. *HYPOTHYMIS AZUREA* (85).

[Valencia, ♂ (not adult), August : iris dark brown ; bill black ; legs dark grey. Dumaguete, ♂, August.]

24. *BUTALIS LATIROSTRIS*.

Muscicapa latirostris, Raffles, Tr. L. S. xiii. p. 312 ; Walden, Ibis, 1873, p. 308.

[Valencia, ♀, August.]

A single example in first plumage, with pale rufous spots on the

sides of the neck and margins to the secondary and tertiary quills and major coverts ; wing 2·56.

25. *BRODERIPUS ACORRHYNCHUS* (90).

[Valencia, ♀ (juv.), August : bill dark sepia-brown. Dumaguete, ♂ (juv.), August : bill dark vandyke-brown.]

Judging by the series Mr. Everett sends (seven) and other examples of the Negros Oriole I have examined, it would appear that the extent of the yellow on the forehead is more restricted in the Negros and Guimaras forms than in examples from any of the other Philippine islands.

26. *MEGALURUS RUFICEPS*.

Megalurus ruficeps, Tweeddale, Ann. & Mag. Nat. Hist. ser. 4, vol. xx. ; P. Z. S. 1877, p. 94.

[Valencia, ♀, August : iris light clay-brown.]

Males from the same locality are of equal dimensions. New to Negros.

27. *DASYCROTAPHA SPECIOSA*.

Dasycrotapha speciosa, Tweeddale, P. Z. S. 1878, pl. ix. p. 114.

[Valencia, ♂, August : iris crimson ; bill orange-yellow.]

28. *IXUS GOIAVIER* (99).

[Valencia and Dumaguete, ♂ and ♀, August.]

A series of five, with ear-coverts and sides of head brown.

29. *HYSPIPETES PHILIPPINENSIS* (102).

[Valencia and Dumaguete, ♀, August.]

30. *COPSYCHUS MINDANENSIS* (105).

[Valencia, ♂ and ♀, August. Dumaguete, ♀, August.]

31. *CISTICOLA*, sp. ?

[Valencia, ♂, August : iris light grey-brown ; bill brown ; legs pale tinged with brown.]

Mr. Everett's note, above quoted, refers to a single example of the genus *Cisticola* which I am unable to determine. The example is in perfect plumage and belongs evidently to an adult ; but the great variations in plumage the members of the genus exhibit make it possible that it belongs to some described species ; and I refrain from bestowing what may be a useless title. Its dimensions are smaller than those of any species known to me. Wing 1·62, culmen 0·31, tarsus 0·62. The first primary is relatively long and broad, 0·53. Underneath the general colouring yellow-white, with a rufous tinge on the breast ; flanks, under tail-coverts, wing-lining, and thigh-coverts pale ferruginous. Above the colouring is pale ferruginous-brown, each feather dark centred with brown ; the nape is uniform pale ferruginous-brown, the upper tail-coverts being brighter ferruginous ; the quills are brown margined with the

same pale ferruginous as the upper plumage. Rectrices above pale brown, underneath much paler, with bold subterminal dark brown almost black spots, which show through on the upper surface as brown marks; the inner margins of the quills are pale ferruginous.

This Negros bird differs from N.-Mindanao, Celebes, and Bangkok (Siam) examples of *C. grayi* in its smaller dimensions and longer and broader first primary, and in the absence of the pure uniform rufo-fulvous cap.

The description of *C. semirufa*, Cab., is too meagre for identification, and no dimensions are stated; but it is probably the same bird as *C. grayi*. *C. ruficeps*, Gould (Sclater, P. Z. S. 1877, p. 98), belongs to *C. grayi*, the only difference Dr. Brown's example exhibits being the absence of the rufous tinting of the breast and under surface generally.

32. *ORTHOTOMUS CASTANEICEPS* (113).

[Valencia, ♂ and ♀, August.]

New to Negros and not separable from the type, which inhabits the island of Guimaras.

33. *CORYDALLA LUGUBRIS* (117).

[Dumaguete, ♂ and ♀, August.]

34. *PARUS ELEGANS* (118).

[Valencia, ♂ and ♀, August.]

New to Negros.

35. *ZOSTEROPS NIGRORUM*, n. sp.

[Valencia, ♂ and ♀, August.]

Male and female. Above light olive-green; whole under plumage light greenish-yellow, almost pure yellow; closed wing like the back, outer quill-margins paler; space before the eye almost pure yellow; axillaries and under wing-coverts very pale yellow; a narrow black mark margins the white feathers of the underside of the orbit; rectrices pale brown edged with olive-green. Wing 2.18, tail 1.87, tarsus 0.62, culmen 0.44.

Closely allied to *Z. austeni*, Walden, ex Karen-nee, this Negros species differs in being of a darker shade of green above and a lighter yellow underneath.

36. *DICÆUM HÆMATOSTICTUM*.

Dicæum hæmatostictum (Sharpe, 'Nature,' August 1876, p. 297; Tr. L. S. ser. 2, Zool. i. p. 339).

[Valencia, ♂, August.]

37. *NECTAROPHILA SPERATA* (122).

[Valencia, ♂ and ♀, August.]

38. *ARACHNECTHRA JUGULARIS* (123).

[Valencia, ♂ and ♀, August.]

39. *ÆTHOPYGA MAGNIFICA*.

Æthopyga pacifica (Sharpe, 'Nature,' August 1876, p. 297; Tr. L. S. ser. 2. Zool. i. p. 342; Shelley, Monogr. *Cinnyridæ*, pt. 3, pl.

[Valencia, ♂ and ♀, August.]

In one example (♂) the uropygium is deep orange and not yellow.

40. *ANTHOTHREPTUS CHLOROGASTER*.

Anthreptes chlorogaster (Sharpe, Tr. L. S. ser. 2, Zool. i. p. 342. no. 107, "Negros," (1876).

[Valencia, ♀, August: iris indian-red.]

41. *CORVUS PHILIPPINUS* (125).

[Dumaguete, ♂, ♀, August.]

The disproportion between the dimensions of sexes in the Philippine Crow exhibits itself in the Negros examples sent by Mr. Everett, the wing of the male measuring 12 inches, as against 11 in the female; culmen of male 2.37, of female 2.12.

42. *CALORNIS PANAYENSIS* (128).

[Dumaguete, ♂, ♀, August.]

43. *SARCOPS CALVUS* (129).

[Dumaguete, ♂, ♀, August.]

44. *MUNIA JAGORI* (132).

[Valencia, ♂, ♀, August. Dumaguete, ♂, ♀, "breeding," August.]

May not Meyen's *Fringilla minuta* (Walden 133) be *M. jagori* in first plumage, before the black feathers come in? Otherwise it is remarkable that a species stated by Meyen to occur in numberless troops in the Luzon sugar-plantations has not, since he wrote (1834), been recognized.

45. *OSMOTRERON AXILLARIS* (136).

[Valencia, ♂, August. Dumaguete, ♀, August.]

46. *LEUCOTRERON GIRONIERI* (137)?

[Valencia, ♂, August.]

A single example of a Pigeon much resembling *L. gironieri*, ex Luzon and Guimaras, and probably representing an immature stage of its dress, is sent by Mr. Everett. It differs from all the phases of plumage described by me (*l. c.*) in having the throat, breast, and abdomen pale ashy white, much stained pale verdigris green. The crown and nape rich green like the back. A purple pectoral band is indicated by a few isolated plumes. The first primary is not abruptly attenuated; but perhaps the attenuated first quill is only produced later. The species has not heretofore been recorded from Negros.

47. CARPOPHAGA ÆNEA (141).

[Dumaguete, ♂, ♀, August.

48. IANTHÆNAS GRISEIGULARIS (145).

[Valencia, ♂, August: iris orange; orbital region and basal half of bill dark crimson; apical half of bill pale yellow; feet dull carmine; nails yellowish grey.]

49. MACROPYGIA EURYCERCA, sp. n. (146, *partim*).

[Valencia, ♂, August: iris yellow, with outer ring crimson; orbital region and base of bill crimson; bill light brown; feet carmine.]

Mr. Everett sends a single example, which agrees in every respect with the example obtained in Negros by Dr. B. Meyer, and described by me (Tr. Z. S. ix. p. 218. no. 146) when writing on *M. tenuirostris*. A recomparison made with Luzon examples leaves no doubt that the Negros bird is specifically distinct.

50. TURTUR DUSSUMIERI (147).

[Valencia, ♂, August. Dumaguete, ♂, August.]

51. CHALCOPHAPS INDICA (150).

[Valencia, ♂, August.]

52. EUDROMIAS GEOFFROYI (161).

[Dumaguete, ♀, August: bill black; legs very pale greenish grey; feet darker grey.]

53. RALLINA EURYZONOIDES.

Gallinulæ euryzonoides, Lafresn. Rev. Zool. 1845, p. 368; Tweedale, P. Z. S. 1877, p. 767.

[Valencia, ♂, August.]

New to Negros. The Luzon (Manilla) bird (Tr. Z. S. ix. p. 231. no. 175) has to be compared; for it is doubtful whether it does not rather belong to this species than to *R. fasciata*.

54. HYPOTÆNIDIA TORQUATA (177).

[Valencia, ♀, August.]

New to Negros.

55. LIMOSA ÆGOCEPHALA.

Scolopax ægocephala, Linn. S. N. i. p. 246. no. 16.

[Valencia, August.]

56. NYCTICORAX MANILLENSIS (198).

[Dumaguete, ♂, August: iris golden yellow; bill black, the base, greater part of lower half, and bare orbital skin bright yellow-green; legs and feet light yellow-green, clouded with olive-green in front, and on the upper surface of toes.]

In first plumage.

March 5, 1878.

Prof. Newton, F.R.S., V.P., in the Chair.

The Secretary read the following report on the additions to the Society's Menagerie during the month of February 1878:—

The total number of registered additions to the Society's Menagerie during the month of February was 63, of which 27 were acquired by presentation, 17 by purchase, 4 by exchange, 6 were bred in the Gardens, and 9 were received on deposit. The total number of departures during the same period, by death and removals, was 93.

The most noticeable additions during the month of February were

A pair of Leopards (*Felis leopardus*), obtained from Capt. Phillips, of the S.S. 'Mesopotamia,' February 18th. These Leopards, which were brought from the Persian Gulf by Capt. Phillips on his last voyage, are remarkable for their long hairy coats, bushy tails, and pale body-colour, which reminds one rather of the Ounce (*Felis uncia*). They are probably from some part of the mountainous district of Persia.

Mr. Sclater exhibited a second collection of birds from Duke-of-York Island, New Britain, and New Ireland, which he had received from the Rev. G. Brown, C.M.Z.S. These were mostly duplicates of the collection brought before the Society on the 19th of February last year¹, and consisted of examples of the following species:—

- | | |
|--|------------------------------------|
| 1. <i>Rhipidura setosa</i> . | 12. <i>Centropus ateralbus</i> . |
| 2. <i>Monarcha alecto</i> . | 13. <i>Eclectus polychlorus</i> . |
| 3. <i>Dicranostreptus megarhynchus</i> . | 14. <i>Nasiterna pusio</i> . |
| 4. <i>Nectarinia aspasia</i> . | 15. <i>Lorius hypœnochrus</i> . |
| 5. — <i>frenata</i> . | 16. <i>Carpophaga rubricera</i> . |
| 6. <i>Philemon cockerelli</i> . | 17. — <i>van-wycki</i> . |
| 7. <i>Calornis nitida</i> . | 18. <i>Ædirhinus insolitus</i> . |
| 8. <i>Gracula krefftii</i> . | 19. <i>Chalcophaps stephani</i> . |
| 9. <i>Corvus orru</i> . | 20. <i>Calœnas nicobarica</i> . |
| 10. <i>Dendrochelidon mystacea</i> . | 21. <i>Megapodius eremita</i> . |
| 11. <i>Halcyon sanctus</i> . | 22. <i>Tringoides hypoleucos</i> . |
| | 23. <i>Tringa acuminata</i> . |

Mr. Sclater called special attention to the following specimens, and read the subjoined notes on them:—

6. PHILEMON COCKERELLI (*l. c.* p. 104).

Two additional examples of this *Philemon*, both from New Britain, are in the collection. The species is exactly of the same form as *P. plumigenis* (*Tropidorhynchus plumigenis*, G. R. Gray, P.Z.S.

¹ See P.Z.S. 1877, p. 96; also Mr. Ramsay's notes on the same collection, Proc. Linn. Soc. New S. Wales, vol. i. p. 369.

1858, p. 174) of the Ké Islands, but is a larger and stronger bird, darker on the head, and paler on the throat and belly.

10. *DENDROCHELIDON MYSTACEA* (*l. c.* p. 105).

Five skins from Duke-of-York Island.

12. *CENTROPUS ATERALBUS* (*l. c.* p. 106).

Three examples of this Coucal from New Britain. In one the head is black, and back of the neck partly so; in the second the neck is white; and in the third the head is also white,—showing that, as I suggested (*l. s. c.*), there is much variation in colour in this species.

13. *ELECTUS POLYCHLORUS* (*l. c.* p. 106).

Of twenty skins of this species, mostly labelled “Duke-of-York Island,” but without indication of sex, fifteen are males (green) and five females (red).

18. *ÆDIRHINUS INSOLITUS* (*l. c.* p. 110).

Of this singular Fruit-pigeon, until lately supposed to be so excessively rare, there are no less than nineteen skins from Duke-of-York Island. The sexes are not marked; but there is no variation in their plumage; so we may consider them identical in this respect. Some of the specimens have the frontal knob much more developed, and are probably males.

In Part viii. of his ‘Ornithological Miscellany’ (pl. lxvi.) Mr. Rowley has given us an excellent figure of this species.

21. *MEGAPODIUS EREMITA*, Hartlaub, P. Z. S. 1867, p. 830.

Count T. Salvadori informs me that he has satisfied himself that *Megapodius hueskeri* of Cabanis and Reichenow, as I had called this bird, *l. s. c.*, is identical with the species previously described by Hartlaub under the name above given. He further assures me that my *Megapodius rubrifrons* from the Admiralty Islands (P. Z. S. 1877, p. 556) is undistinguishable.

23. *TRINGA ACUMINATA*, Horsf.

One skin of this species, which was not represented in the first series, from New Ireland.

Mr Sclater took this opportunity of exhibiting the specimen recorded by him (P. Z. S. 1869, p. 123) as *Athene variegata*, and subsequently described and figured by Mr. Sharpe (P. Z. S. 1876, p. 673, pl. lxii.) as *Ninox solomonis*. Mr. Sclater had compared this specimen with the type of *Noctua variegata* of Quoy and Gaimard, and had ascertained that his identification was correct, and that there was therefore no need of Mr. Sharpe’s new name for the specimen.

Mr. Slater exhibited a stuffed Coot belonging to the Museum of Science and Art at Edinburgh and believed to be the typical specimen of *Fulica gallinuloides* of King (Zool. Journ. iv. p. 96), and showed that it was really an example of *Fulica leucoptera*, Vieillot, and not of *Fulica armillata*, as he and Mr. Salvin (P. Z. S. 1868, p. 465 et Ex. Orn. p. 115), misled by Capt. King's imperfect description, had supposed.

Professor Newton, M.A., F.R.S., V.P.Z.S., exhibited a stone sent him by Mr. Caldwell, C.M.Z.S., and remarked :—

“The veracity of the earliest writer who treated at any length of the Solitaire (*Pezophaps solitaria*) affords a pleasing contrast with that of the latest. Many of the statements put forth by Leguat concerning that bird have already been curiously confirmed; and I have much pleasure in laying before the Society what appears to be another proof of his accuracy. Writing of the hen Solitaires he says :—

“On leur trouve toujours dans le gésier (aussi bien qu'aux mâles) une pierre brune de la grosseur d'un Oeuf de poule; elle est un peu raboteuse, platte d'un côté & arrondie de l'autre, fort pesante, & fort dure. Nous avons jugé que cette pierre naît avec eux; parce que quelque jeunes qu'ils soient, ils en ont toujours, & n'en ont jamais qu'une; & qu'outre cela, le canal qui va du jabot au gésier, est trop étroit de moitié pour donner passage à une pareille masse. Nous nous en servions préférablement à aucune autre pierre, pour aiguïser nos couteaux”¹.

“When Mr. H. H. Slater was appointed by the Royal Society Naturalist to the Transit-of-Venus Expedition in Rodriguez, I especially drew his attention to this statement; but I have understood from him that, notwithstanding his careful examination of the caves of that island, he never found any thing bearing out Leguat's assertion. Shortly after his return, our Corresponding Member, Mr. Caldwell, of Mauritius, visited Rodriguez, as the Society is already aware (Proc. Zool. Soc. 1875, pp. 644–647). He was, as he has told us, more fortunate, and obtained three or four of what he believes to be the stones mentioned by Leguat. One of these he has been so good as to give to my brother, Mr. Edward Newton; and on behalf of both those gentlemen I now exhibit it. You will see that in most respects it agrees closely with the description of Leguat. It is brown, somewhat rough, heavy and hard. It is hardly, however, flattened on one side; and in connexion with that fact I may remark that the bird with whose remains it was associated appears to have been young. Its mineralogical nature has yet to be determined; but before it is cut up for that purpose I thought the Members of the Society would like to see it. Its weight is a little over $1\frac{3}{4}$ oz.

“Mr. Caldwell has also been so kind as to furnish me with some remarks on this and the other specimens he obtained: but his state-

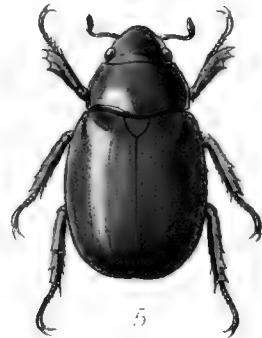
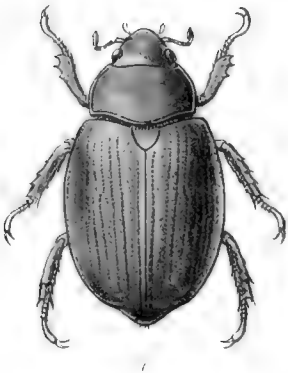
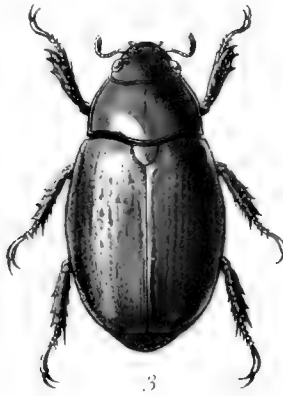
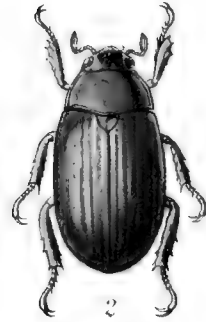
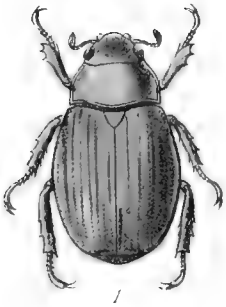
¹ Voyages et Aventures de François Leguat &c. Londres: MDCCVIII. vol. i p. 100.

ments respecting them will possibly be more advantageously published as an appendix to the account of this bird which, as most (though apparently not every one) of our Members are aware, was drawn up more than twelve months ago, at the request of the Royal Society, by Mr. J. W. Clark and Mr. Edward Newton."

Mr. T. J. Parker exhibited and made remarks upon the stridulating organ of the Common Rock-Lobster (*Palinurus vulgaris*). He stated that the apparatus in question was produced by a peculiar modification of the antennulary sternum and of the basicerite or second joint of the antenna. The antennulary sternum forms a projecting vertical keel, with a rounded anterior border, and slightly convex sides; the anterior border is grooved in the middle line, the groove being bounded on each side by a strong smooth ridge; each lateral surface is marked with a shallow groove; and between this groove and the border, to which it is parallel, the surface is so smooth as to have the texture of polished ivory. The basicerite is uncalcified along a slit-like space on its inner surface; this space is filled up with a thick chitinous membrane, which is produced superiorly into a large flap, projecting outwards from the surface of the joint. Immediately beneath this flap the chitin becomes thickened, takes on the form of an oval area or pad, about $\frac{1}{3}$ inch long by $\frac{1}{4}$ inch wide, and marked by a number of fine parallel ridges. In relation with the inferior edge of this pad is a small calcified tubercle. When the antenna is in place, the flap works over the ridge on the corresponding side of the anterior border of the antennulary sternum, the tubercle fits into the groove on its lateral surface, and the ridged pad is closely applied to the smooth space between the groove and the border. Under these circumstances, when the antenna is moved upwards the friction of the pad against the smooth surface produces a loud grating noise, the principle being similar to that of the sound produced by the friction of india-rubber against paper. The apparatus can at any time be thrown out of gear, and the antenna moved noiselessly, by slightly abducting the latter. In November last, Mr. Saville Kent remarked in 'Nature' upon the "shrill squeaking sound" emitted by living specimens of *Palinurus* when handled, this sound being due, according to Mr. Kent, to the friction of the abdominal somites; and Mr. Parker suggested that the noise referred to may possibly have been produced by the apparatus described. He stated further that the apparatus was possessed by both sexes, although in the two specimens examined the noise produced was far louder in the male; and he also remarked upon the fact that, notwithstanding the great perfection of the stridulating organ, the auditory organ of *Palinurus* is in a very imperfect condition.

The following papers were read:—





1. Notes on some Coleoptera of the Genus *Plusiotis*, with Descriptions of three new Species from Mexico and Central America. By A. BOUCARD, C.M.Z.S.

[Received February 4, 1878.]

(Plate XVI.)

I have again the pleasure to exhibit to the Fellows of this Society a fine series of Beetles of the genus *Plusiotis*, which I have acquired since I wrote my former paper on these Insects in the 'Proceedings'¹.

Amongst them are four new species totally distinct from all others. Three of these have been liberally given to me by my friends MM. Sallé, Baden, and Rodriguez. The fourth I discovered during my last voyage in Costa Rica. This increases the number of species known of these fine insects to twenty, of twelve of which the types are in my collection.

During my recent journey in Costa Rica, I have also been able to procure one more specimen of *Plusiotis batesii*, which agrees completely with the type, and one specimen of *Plusiotis chrysargyrea*, Sallé, varying from the original types of the species, not being quite of the same colour.

These insects are excessively rare, and appear to confine themselves to the forests, at a very high altitude.

I was in Costa Rica in the proper season, and at the exact locality where these insects are found; but I was not able to get more than three specimens, although I offered a high price for them to the natives, and did myself all that possibly could be done; I made several excursions on purpose, but with no result.

Every one in the country knew what I meant when I asked for golden and silvery beetles; but they did not procure me any.

PLUSIOTIS BATESII.

Plusiotis batesii, Boucard, P. Z. S. 1875, p. 119, pl. xxiii.

Hab. Volcano of Irazu, Costa Rica.

One specimen of this fine species, found in May near Potrero Cerrado, at the altitude of 8000 feet, was alive, but had lost its abdomen and some of its legs. It had evidently just been caught by a bird and dropped, or had disengaged itself, after having lost its abdomen. The vitality of this insect is so great, that several hours after I had found my specimen it could still move part of its body and its remaining legs. Although I looked with the greatest care for this insect, I was not able to find any more specimens.

At the suggestion of my friend Sallé, who thought that they ought to be found abundantly on Mimosa trees, like *Pelidnota*, I searched for them during many days on these plants, but without success, and those which I secured were found in the oak-tree region. I saw another specimen, which I consider to be a very fine variety of this

¹ See P. Z. S. 1875, p. 117.

species, in a small collection of insects made by Mr. Rogers. It is of the most splendid brass-colour ; it was found near Rancho redondo, on the Volcano of Irazu, by an Englishman who was in the company, Mr. Rogers.

This insect is now in the collection of Mr. Du Cane Godman.

PLUSIOTIS CHRYSARGYREA.

Pelidnota chrysargyrea, Sallé, Annales de la Soc. Ent. de France, tome iv. p. 362.

One specimen of this magnificent species, found in April in the Candelaria Mountains, at the altitude of 5000 feet, in the oak-tree region.

It is quite perfect, and was taken alive on a roble tree (*Tecoma pentaphylla*, Jacq.). Being somewhat different from the types of the species, I give a description of it :—

Oblongo-ovata ; capite thoraceque aureo-pallidis, margine rubro ; elytris aureis, tenuiter punctatis, punctis in striis regulariter dispositis ; infra aurea, tibiis tarsisque cupreis, antennis fuscis.

Length 1 inch $1\frac{1}{2}$ line. *Mus.* Boucard.

Head, thorax, and elytra very slightly punctured, of a pale burnished gold-colour with coppery-red reflections ; the anterior margin of the head and the sides of the thorax of a coppery-red colour, which distinguishes this species from *P. batesi* ; tibiæ and tarsi of the same colour, with blue claws ; abdomen and pygidium of a brilliant golden colour ; antennæ rufous.

Its place is near *P. batesi*, to which it is closely allied.

PLUSIOTIS LÆTA, Sturm, Cat. 1843, p. 341.

According to M. Auguste Sallé, of Paris, who possesses the type of *P. læta*, Sturm, this species must be abolished, as it was described from a bad specimen of *Plusiotis psittacina*, which is from Mexico.

This proves that I was right when I suggested in my former paper that the locality of Valparaiso for this species was probably wrong ; as up to this date no species of *Plusiotis* has been found south of Columbia.

PLUSIOTIS BADENI, n. sp. (Plate XVI. fig. 2.)

Oblongo-parallela, valde convexa, supra viridi-argentea, capite cupreo-violaceo, medio viridi crebre punctulato ; thorace subtiliter punctulato, margine cupreo-violaceo, scutello violaceo lævi ; elytris tenuiter punctatis, punctis in striis profundis regulariter dispositis ; infra viridi-argentea, femoribus viridibus, tibiis cupreo-violaceis, tarsis cupreo-aureis, antennis fuscis.

Length $7\frac{1}{2}$ lines.

Head of a coppery purple colour with the centre green, thorax silvery green, with a broad margin of the same colour as the head, both slightly punctured ; the scutellum is also of that same colour ; elytra silvery green, slightly darker than the head and thorax, strongly punctured, the punctuation disposed in regular striæ ; the

underside is of a paler green with silvery reflections; tibiæ coppery purple, and tarsi coppery metallic; antennæ rufous.

Hab. Mexico.

The female of this species is of the same size, but a little wider; the tarsi are less coppery; and the colour of the thorax, elytra, and pygidium is slightly paler.

This species must be placed between *P. gloriosa*, and *P. lacordairei*.

I have pleasure in naming this fine insect after my friend Doctor Baden, to whom I am indebted for the specimen now in my collection.

Types, museums Baden and Boucard.

PLUSIOTIS RODRIGUEZI, n. sp. (Plate XVI. fig. 1.)

Oblongo-conveva, supra viridi-aurea; capite thoraceque subtiliter punctulatis; elytris punctatis, punctis in striis regulariter dispositis, margine lato aureo splendido; infra pallide viridis, tibiis tarsisque aureis, antennis rufis.

Length 1 inch.

Head and thorax slightly punctured, the latter twice as long as it is broad, convex, with a reddish gold margin, elytra strongly punctured; the punctuation is disposed in regular striæ, convex, broader in the middle and rounded in the base with a magnificent gold margin all round; the underside is of a pale uniform green with silvery reflections; tibiæ and tarsi golden; antennæ rufous.

Hab. Guatemala.

I have only one specimen of this charming species, the only one which was collected in the neighbourhood of Guatemala City by my intimate friend Mr. Juan Rosé Rodriguez, to whom I have the pleasure of dedicating this fine insect. It was found by him in the forests of oak trees near the capital. Its place is between *P. costata* and *P. sallei*, Bouc.

Type, mus. Boucard.

PLUSIOTIS PRASINA, n. sp. (Plate XVI. fig. 5.)

Oblongo-ovata, supra viridi-prasina; capite fortiter punctulato, thorace subtiliter punctulato; elytris fortiter punctatis, punctis in striis irregularibus; infra viridis, tibiis tarsisque violaceo micantibus.

Length 1 inch 1 line.

Head and elytra of a dark metallic green, both strongly punctured; on the latter the punctuation is disposed in irregular striæ; they are oblong, a little broader in the middle, with a prominent, thick, and compressed margin on the sides, which is very conspicuous; thorax slightly punctured, of the same colour; the underside is metallic green; tibiæ metallic purple; tarsi of the same colour, with coppery reflections; claws nearly black; antennæ dark rufous.

Hab. Mexico.

Its place is between *P. auripes* and *P. sallei*.

I have only one specimen of this insect, which was given to me by my intimate friend M. Auguste Sallé.

Types, museums Boucard and Sallé.

PLUSIOTIS BOUCARDI, Sallé. (Plate XVI. fig. 3.)

Oblongo-parallela, valde convexa; capite thoraceque viridi-aureis, subtiliter punctatis, margine cupreo; elytris splendide viridi-aureis, fortiter punctatis; infra cupreo-rufa, tibiis tarsisque nigris, antennis fuscis.

Length 1 inch 2 lines.

Head, thorax, pygidium, and elytra of a magnificent metallic golden green, with red reflections, surrounded by a narrow coppery-red margin. The elytra are rugose and strongly punctured; the underside is of a coppery red; femora, tibiæ, and tarsi quite black in the anterior legs; in the middle and posterior pairs the femora are coppery red and the tibiæ and tarsi are black; antennæ nearly black.

Hab. Costa Rica.

I have only one specimen of this magnificent species, found in the mountains of Candelaria, in the forest of robles (oak trees) at the altitude of 5000 feet.

Its place is near *P. victorina*.

Type, museum Boucard.

I have seen all the species of this genus described in this and my previous paper, and am satisfied that they are good and distinct. I have examples of all of them in my collection, except *P. psittacina* and *P. gloriosa*.

EXPLANATION OF PLATE XVI.

- Fig. 1. *Plusiotis rodriguezi*, p. 295.
 2. *P. badeni*, p. 294.
 3. *P. boucardi*, p. 296.
 4. *P. muizechii*, P. Z. S. 1875, p. 124.
 5. *P. prasina*, p. 295.

2. On a small Collection of Lepidoptera obtained by the Rev. J. S. Whitmee at the Ellice Islands. By ARTHUR G. BUTLER, F.L.S., F.Z.S., &c.

[Received Feb. 6, 1878.]

The little series of Lepidoptera obtained from the Ellice Islands by Mr. Whitmee, although it contains only five species of Butterflies and two of Moths, makes a valuable addition to our knowledge of the geographical distribution of the forms inhabiting the Australian region, since we have hitherto been quite ignorant of the insect-fauna of these islands.

Of the seven species, all of which are described, one is of special interest to me; I refer to *Euplœa distincta*, a form figured by Herrich-Schäffer, from an example taken in the Viti Islands, as a variety of *E. eleutho*. To this insect I gave a name in my "List of the Diurnal Lepidoptera of the South-Sea Islands" (P. Z. S. 1874, pp. 274-291), and was severely censured for so doing by Herr

Schmeltz, in a paper criticising my determinations of South-Pacific Butterflies. Herr Schmeltz considered *E. distincta* to be an individual variety, and regarded it as an injury to science to give it a name; it is therefore satisfactory to find that *E. distincta* is the common *Euplœa* of the Ellice Islands, and consequently may be regarded as a fixed local form, of equal importance with *E. helcita*, *E. angasii*, and others of the *E.-eleutho* group.

RHOPALOCERA.

NYMPHALIDÆ.

EUPLŒA, Fabricius.

1. EUPLŒA ELEUTHO.

Danaïs eleutho, Quoy & Gaimard, in Freycinet's Voy. pl. 83. fig. 2 (1815).

The fact that this species is so rare that Mr. Whitmee only brought home a single example seems to show that its time of appearance is not synchronous with that of *E. distincta*. It represents the opposite extreme of modification in the group to which it belongs, and therefore is not likely to be a variety, since forms more nearly approaching *E. distincta* in character are known to be locally constant.

2. EUPLŒA DISTINCTA.

Euplœa distincta, Butler, P. Z. S. 1874, p. 278.

A good series, in both sexes, was obtained by Mr. Whitmee.

JUNONIA, Hübner.

3. JUNONIA VILLIDA.

Papilio villida, Fabricius, Mant. Ins. p. 35. no. 366 (1787).

Resembles Australian examples, being less suffused with orange tawny than Samoan specimens.

DIADEMA, Boisduval.

4. DIADEMA NERINA.

Papilio nerina, Fabricius, Syst. Ent. p. 509. no. 277 (1775).

The whole of the specimens are rather small, resembling those of Cape York.

5. DIADEMA OTAHEITÆ.

Diadema auge, Cramer, var. *otaheitæ*, Felder, Verh. zool.-bot. Ges. Wien, xii. p. 492. no. 185 (1862).

This may possibly be a dwarfed race of the preceding species; it is the common form of Samoa, where the specimens run even smaller than in the Ellice Islands.

HETEROCERA.

LITHOSIIDÆ.

DEIOPEIA, Stephens.

6. DEIOPEIA PULCHELLA.

Tinea pulchella, Linnæus, Syst. Nat. 1, ii. p. 884 (1766).

Larger than Australian specimens, and with the red dashes on the primaries broader and longer.

OPHIUSIDÆ.

ACHÆA, Hübner.

7. ACHÆA MELICERTE.

Phalæna-Noctua melicerte, Drury, Ill. Ex. Ent. i. p. 46, pl. 23. fig. 1. (1770).

One worn example was obtained of this widely distributed moth.

3. Notes on the *Penæidæ* in the Collection of the British Museum, with Descriptions of some new Species. By EDWARD J. MIERS, F.L.S., F.Z.S., Zoological Department, British Museum.

[Received February 12, 1878.]

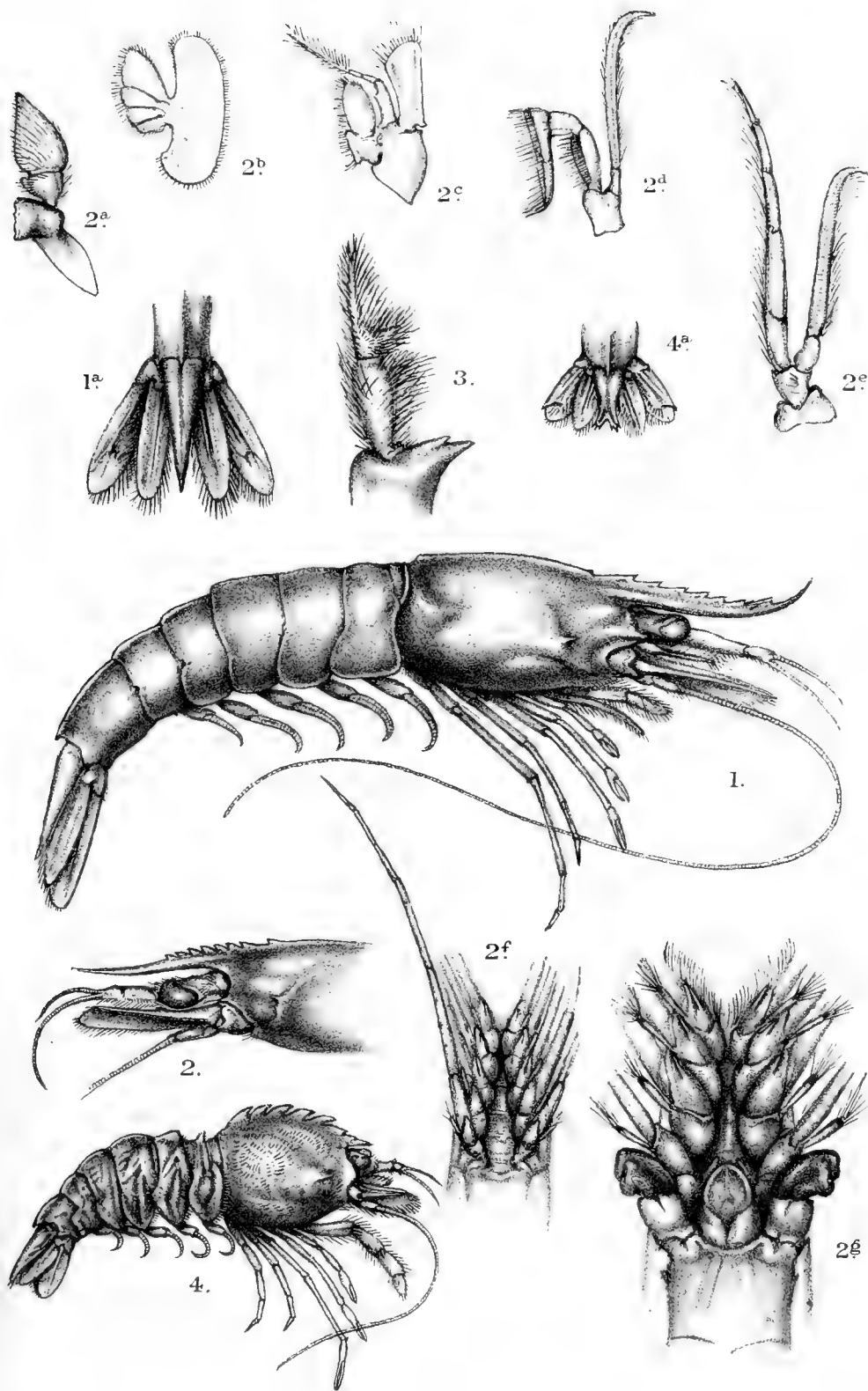
(Plate XVII.)

Mr. G. E. Dobson, M.B., F.L.S., lately presented to the Trustees of the British Museum a remarkable specimen of *Penæus*, with the request that I should lay a description of it before the Society. In studying the affinities of this form, which is described below under the name of *P. dobsoni*, I found it necessary to revise the characters of the whole of the species of this large and difficult genus; and although the materials existing in the national collection are not rich enough at present to permit of a complete review of the subject, it is hoped that the following notes on the species in the collection will contribute toward the elucidation of the genus, while the synoptical key to the genus appended will serve to indicate what appear to be the principal distinctive characters of the different species, and to mark what are *desiderata* in the collection of the British Museum. I have added some remarks upon the *Funchalia woodwardi*, and on the *Penæus edwardsianus* of Mr. J. Y. Johnson, showing that this latter species must be referred to the genus *Aristeus* of Duvernoy; also a description of a species of *Sicyonia* not hitherto recorded.

PENÆUS CANALICULATUS.

Palæmon canaliculatus, Olivier, Encycl. Méth. Hist. Nat. viii. p. 660 (1811).

Penæus canaliculatus, M.-Edw. Hist. Nat. Crust. ii. p. 414 (1837); De Haan, Faun. Japon. Crust. p. 190 (1849).



C. Berjeau del et lith.

Mintern Bros imp.

NEW SPECIES OF PENÆIDÆ.



Penæus marginatus, Randall, Journ. Ac. Nat. Sci. Phil. viii. p. 146 (1839).

? *Penæus plebejus*, Hess. Arch. f. Nat. p. 168, pl. vii. fig. 19 (1865).

The series in the British-Museum collection includes specimens from the Gulf of Suez, Shanghai, Yokohama (Japan), Torres Straits, Shark Bay, Houtmann's Abrolhos, Sir-C.-Hardy Island, and the Loyalty Islands (Lifu). In both sexes there is a single spine on the second joint of the first and second pairs of legs, and none on the third pair of legs. In the closely allied European *P. caramote* there is, besides these spines, a spine upon the first joint of each of the first three pairs of legs. The sixth postabdominal segment is not sulcate in either species; and in both the terminal segment is armed with lateral marginal spines.

PENÆUS BRASILIENSIS.

Penæus brasiliensis, Latr. Nouv. Dict. Hist. Nat. xxv. p. 256 (1817); M.-Edw. Hist. Nat. Crust. ii. p. 414 (1837); Stimpson, Ann. Lyc. Nat. Hist. New York, x. p. 132 (1871).

This species in external characters closely resembles the preceding, but differs in the following particulars:—There is a spine upon the second and third joints of the first pair of legs, one upon the second joint of the second pair of legs, and none upon the third pair of legs. The sixth postabdominal segment is grooved on either side of the longitudinal median carina on its upper surface. There are no spines on the lateral margins of the seventh postabdominal segment.

Specimens from Whydah on the west coast of Africa agree in all respects with authentic specimens from Brazil presented by the Paris Museum, and with specimens from the West Indies (Barbadoes) and North America, proving that this, like many other species, occurs on both sides of the Atlantic.

PENÆUS SEMISULCATUS.

Penæus semisulcatus, De Haan, Faun. Japon. Crust. p. 191, pl. xlv. fig. 1 (1849).

A large series of specimens of both sexes is in the Museum collection, agreeing with De Haan's description and figure. It is probable that under the Fabrician name of *P. monodon* two closely allied but apparently distinct species were confounded by earlier authors. In *P. semisulcatus* the rostrum is 7-8-toothed above and 3-toothed below, the dorsal carina, which is faintly or obsoletely canaliculated, extends to the posterior margin of the carapace, and the gastro-hepatic sulcus is faintly defined. There are examples from India (Pondicherry, Calcutta), Formosa, the Philippines, North Australia, and the Fiji Islands (Mbau), in the Museum collection.

In two specimens from Australia (Shark Bay), and one from Ceylon, the rostrum is 6-7-toothed above, the teeth toward the apex separated by much wider intervals than in the specimens referred to

P. semisulcatus, there is a short dorsal carina which does not reach to the posterior margin of the cephalothorax and is not canaliculated above, and the gastro-hepatic sulcus is very deep and strongly defined. For this latter form I propose to retain Fabricius's name of *P. monodon*, if the two species be distinct; as it would seem that the common Indian form must be designated by De Haan's name of *P. semisulcatus*, it having been first distinctly characterized by him, while it is impossible to ascertain from Fabricius's brief description which of the two species was known to that author.

The figure of *P. tahitensis* of Heller (Reise der Novara, Crust. p. 121, pl. xi. fig. 2, 1865) resembles this species; and in it the rostrum is represented as 3-toothed below; but it is described as edentate; so I cannot refer it with certainty to *P. semisulcatus*.

The *P. carinatus* of Dana (U.S. Expl. Exp. xiii., Crust. i. p. 602, pl. xl. fig. 2, 1852), from Singapore, is only briefly described, but appears to be identical with *P. semisulcatus*, with which it agrees in the form and number of the teeth on the rostrum. It is not, however, mentioned in the description whether the longitudinal carina on the cephalothorax is sulcate or not.

PENÆUS HARDWICKII, sp. n. (Plate XVII. fig. 1.)

The cephalothorax is very minutely granulated; the cervical suture is in its posterior half, and the cardiaco-branchial altogether, obsolete; a canaliculated dorsal crest extends from the base of the rostrum to the posterior margin. The rostrum reaches beyond the peduncles of the antennules, is 8-9-dentate above, the last tooth separated by twice the ordinary distance from the preceding; the inferior margin is entire; it is curved regularly upward toward the distal extremity, which is acute. There is a spine on the underside of the second joint of the first and second pairs of legs, and none on the third pair. The form of the sternum is as in the *P. curvirostris* of Stimpson; and the third to sixth postabdominal segments are carinate as in that species. The last postabdominal segment is deeply longitudinally sulcate above, and, as in *P. semisulcatus*, acute at apex, without lateral spines.

Hab. Indian Seas? (*Hardwicke*).

There are two specimens in the British-Museum collection, of which the exact locality is not known. This species is most nearly allied to *P. curvirostris*, Stimpson, from Simoda, Japan, but differs in having a canaliculated dorsal crest, and a longer rostrum, which is acute at the extremity; the sutures of the cephalothorax are also much less distinct. From the *P. semisulcatus* of De Haan, which resembles this species in having a single longitudinal dorsal sulcus, it differs in the form of the rostrum, which is edentate below, and in having only a single spine at the base of the first pair of legs,—and from the *P. sculptilis* of Heller, from Java, another unisulcate species, in the longer, more curved rostrum, and in the postabdomen being keeled only on the third to sixth segments, whereas in *P. sculptilis* all the postabdominal segments are said to be keeled.

PENÆUS INDICUS.

Penæus indicus, M.-Edw. Hist. Nat. Crust. ii. p. 415 (1837).

Penæus stylirostris, Stimpson, Ann. Lyc. N. H. N. York x. p. 134 (1871).

In specimens in the British-Museum collection from the Indian seas, Ceylon, and Chefoo, which I refer to this species, the first pair of legs are bispinose at base, the second pair unispinose, and the third pair unarmed; there are no lateral marginal spines on the last postabdominal segment. The rostrum in young specimens considerably projects beyond the antennal scale, and the median dorsal carina reaches nearly to the posterior margin of the cephalothorax; in adult specimens, however, the rostrum scarcely projects beyond the antennal scale, and the dorsal carina is nearly obliterated. In one specimen, fully adult, from Amoy, which is probably only a variety of this species, the rostrum is even shorter than the antennal scale, and $\frac{2}{3}$ -dentate.

I cannot find any valid characters by which to distinguish from this species the *P. stylirostris*, Stimpson, of Panama, of which specimens, from that locality, are in the British-Museum collection.

PENÆUS MONOCEROS.

Penæus monoceros, Fabr. Ent. Syst. Suppl. p. 409 (1798); M.-Edw. Hist. Nat. Crust. ii. p. 415 (1837); De Haan, Faun. Japon. Crust. p. 192, pl. xlv. fig. 2, *P. ensis* (1849); Dana, U.S. Expl. Exp., Crust. i. p. 605, pl. xl. fig. 5 (1852).

Specimens in the British-Museum collection from the Indian seas, Calcutta, Ceylon, and Penang, agree with M.-Edwards's short description, and possess the diagnostic characters indicated by De Haan, but differ from De Haan's longer description in having no lateral marginal spines on the terminal segment. De Haan's specimens belong perhaps to a distinct species, in which case the name of *P. ensis*, as they are designated in the plate, would be applicable to them.

PENÆUS MEMBRANACEUS.

Penæus membranaceus, Risso, Crust. des environs de Nice, p. 98 (1816); Hist. Nat. Eur. Mérid. v. p. 68 (1826); M.-Edw. (part.), Hist. Nat. Crust. ii. p. 417 (1834); Heller, Sitz. Akad. Wissensch. xlv. i. p. 423, pl. ii. fig. 49 (1862); Crust. südl. Europa, p. 296, pl. x. fig. 11 (1863).

Penæus longirostris, Lucas, Explor. Sci. Algérie Crust. p. 46, pl. iv. fig. 6 (1849).

Penæus bocagei, Johnson, Proc. Zool. Soc. p. 255 (1863), p. 900 (1867).

See Johnson's remarks (P. Z. S. 1867, p. 900) on the complicated synonymy of this species. If Dr. Heller's views are correct, Milne-Edwards attributes to *P. membranaceus* some of the characters of the *Solenocera siphonocera* (*Penæus siphonocerus*, Philippi), subsequently described by Lucas, Ann. Soc. Ent. France, viii. p. 219

(1850), under the name of *Solenocera philippii*. Besides *P. siphonocerus* the *Penæus distinctus* of De Haan (Faun. Japon. Crust. p. 194, 1849) evidently belongs to this genus, and must be designated *Solenocera distincta*. Of it I have seen no specimens.

Perhaps also the *Penæus crassicornis* of Milne-Edwards (Hist. Nat. Crust. ii. p. 418, 1837) from India should be referred here.

PENÆUS DOBSONI, sp. n. (Plate XVII. fig. 2.)

Cephalothorax smooth, not hairy or scabrous, with the cervical, gastro-frontal, and cardiaco-branchial sutures faintly indicated. Antennal and hepatic spines present, but no pterygostomial spine at the antero-inferior angle of the cephalothorax. Rostrum slender, not quite reaching to the apex of the antennal scale, 7-9-dentate above, about four of the teeth being posterior to the frontal margin, the posterior tooth separated by a greater interval than the others, which are equidistant from one another; there are no teeth on the anterior third of the upper margin, nor on the inferior margin; the apex, in the only specimen which appears perfect, is acute. Posteriorly the rostrum is prolonged into a short median dorsal crest, which terminates at some distance from the posterior margin. There are no longitudinal median dorsal *sulci*. The first five postabdominal segments are rounded at their postero-lateral angles; the posterior margins of the first, second, fourth, and fifth have a semicircular notch on each side of the body; there is a longitudinal median dorsal carina on the third to sixth segments, which is but faintly indicated on the third segment, and a faintly indicated lateral carina on each side of the fifth and sixth segments; the terminal segment is longitudinally sulcate above, the extremity very slender and acuminate, the lateral margins ciliated, but without mobile spines; the appendages of the sixth segment somewhat oblong-oval, and narrowed at the distal extremities.

The eyes are very large; the antennules with the joints of the peduncle flattened on their inferior surfaces, and with two flagella, of which the inner is nearly twice as long as the outer, but not as long as the cephalothorax. Antennæ with the flagella very long. The crowns of the mandibles are slightly concave on their inner surfaces, the cutting-edges thin, and with a tooth near the apex; the palpus tomentose and 2-articulate, the terminal joint foliate, triangular and acute. The second maxillipedes are densely hairy; the outer maxillipedes are very slender, almost styliform, and their exognathi reach almost to the extremity of the penultimate joint. The three anterior pairs of legs are small and very slender, successively slightly increasing in length, but the third pair not more robust than the preceding; they are very feebly didactyle, and the fingers are much shorter than the palmar portion of the hand; the fourth pair of legs are very feeble, and much shorter than the preceding; the fifth pair are obsolete, thickened, and two-jointed, the terminal joint constituting an indurated corneous lobe; there is also a small lobate prolongation at base of each of the fourth legs; and the lobe between the bases of fifth pair of legs (which resembles in form that usual

in the female of *Penæus*, but is not divided by a median fissure) is of the same corneous consistency. All the legs, except the fifth rudimentary pair, are furnished with an exopodite. There is a spine on the under surface of the second joint of the legs of the first three pairs, that on the third pair of legs very small.

Hab. Mangalur (Mangalore), west coast of India.

Collected by Dr. G. E. Dobson, to whom I have much pleasure in dedicating the species.

I have examined four specimens of this species, all of which are certainly females. One of these has been presented by Dr. Dobson to the trustees of the British Museum. The fact that no males have yet been observed renders it possible that the rudimentary and indurated condition of the fifth pair of legs may be peculiar to the female sex—an opinion shared both by Dr. Semper and Mr. Wood-Mason, who have seen the specimens; and as the mouth-appendages, although presenting some peculiarities, do not depart widely in structure from the type usual in *Penæus*, I think it advisable until more specimens shall have been examined, to retain the species in that genus. Should further researches, however, prove that the rudimentary condition of the fifth legs exists in both sexes, the name *Mangalura* may be adopted to designate the genus, which will be characterized not only by the above-mentioned character, but also by the triangular shape of the terminal joint of the mandibular palpus (which is less delicate and transparent in texture than is usual in *Penæus*), and the slender outer maxillipedes. The species will then stand as *Mangalura dobsoni*¹.

The form of the fifth pair of legs is not analogous with that characteristic of the very different genus *Sergestes*, wherein these members, although rudimentary, are very slender, and similar in structure to the preceding pairs.

In the form of the rostrum *P. dobsoni* resembles the *Penæus sculptilis* of Heller, from Java (Voy. Novara, Crust. p. 122, pl. xi. fig. 1); but, besides the characters derived from the fourth and fifth pairs of legs, which are of the normal form in *P. sculptilis*, that species differs, if the figure be correct, in the much longer flagella of the antennules, and in the absence of a notch in the posterior margin on the sides of the first and second postabdominal segments, in the form of the first postabdominal segment, which is rounded at its

¹ Since writing the above, Professor Wood-Mason has discovered, among specimens of *P. dobsoni* from the same locality (Mangalore), a single male individual, in which he observed that the fifth legs are fully developed, and which, by his kindness, I am now enabled to figure (see Pl. XVII. fig. 2, f). It is of very small size, not much more than half as large as the females described by me, which it in all respects resembles, except in the fifth legs. These are very slender and elongated, longer, in fact, than those of the preceding pair, with the dactylus much shorter than the preceding joint. The fact, therefore, that the rudimentary condition of the fifth legs is a sexual character peculiar to the female may be regarded as definitely established; nor does it seem that this can possibly be accidental, or due to the loss of the legs and subsequent induration of the joint, as the indurated terminal lobe is of the same shape on both legs in all four of the specimens seen by me, and I have never observed a similar condition of the joint in any other specimen of the genus.

antero-inferior angle, &c. The sex of the specimens of *P. sculptilis* is not stated.

In the *P. avirostris*, Dana (U.S. Expl. Exp. xiii. Crust. i. p. 603, pl. xi. fig. 3, 1852), from Singapore, which is but shortly characterized, the rostrum is somewhat of the same form, but straighter, shorter, and only 6-toothed above, the legs of the two posterior pairs much more slender than the preceding (sex not stated). The cephalothorax is not dorsally carinate in its posterior half.

PENÆUS AFFINIS.

Penæus affinis, M.-Edw. Hist. Nat. Crust. ii. p. 416 (1837); De Haan, Faun. Japon. Crust. p. 192, pl. xlvi. fig. 3, *P. barbatus* (1849).

Penæus velutinus, Dana, U.S. Expl. Exp. xiii. Crust. i. p. 604, pl. xl. fig. 4 (1852).

Whether this species be the *P. affinis* of Milne-Edwards must remain uncertain, as his type specimen has not been figured, and his short description leaves many particulars unnoticed; but it is certainly the one figured by De Haan under the name of *P. barbatus*, and referred by him in the text to *P. affinis*. *P. velutinus* of Dana (U.S. Expl. Exp. xiii. Crust. i. p. 604, pl. xl. fig. 4, 1852) from Lahaina, Sandwich Islands, seems to be also referable to the same species. His description applies to it; and although his figure, when compared with that of De Haan, presents some slight differences, they are probably due to inaccuracies of drawing. Examples of this species are in the British-Museum collection from Japan, Sandy Cape, Sharks' Bay, West Australia, and the Gulf of Suez; hence it would appear to have a wide geographical range.

P. constrictus, Stimpson (Ann. Lyc. Nat. Hist. New York, x. nos. 4, 5, p. 135, 1871), from the coast of Carolina, U. S., of which there is one specimen in the British-Museum collection, presented by the Smithsonian Institution, is nearly allied to the above. The teeth of the rostrum are stated to be equidistant by Stimpson; but in the specimen I have examined, the last tooth is (as in *P. affinis*) separated by a wider interval than the preceding. It differs, however, in being much less pubescent (the postabdomen is naked and glossy), and in having a very deep longitudinal median sulcus on the last segment, which is margined by lateral carinæ.

P. pubescens of the same author (*l. c.* p. 133), based upon a single female example with imperfect rostrum from St. Thomas, would also seem from the description to be closely allied to *P. affinis*, and, in the absence of specimens for comparison, I am unable to say how it may be separated from that species. It will probably prove to be distinct, on account of the widely distant locality; therefore I do not quote it as a synonym of the Indo-Pacific form.

PENÆUS STYLIFERUS.

Penæus styliferus, M.-Edw. Hist. Nat. Crust. ii. p. 418 (1837).

There is a single specimen, a male, in bad condition, which I refer

with some hesitation to this species, in the Museum collection. The rostrum is of the form described by Milne-Edwards, but reaches but little beyond the peduncle of the antennules, and scarcely at all beyond the antennal scale. The fifth pair of legs is considerably longer than the preceding, and very slender; the dactylus small, of the usual form. This species cannot be the male sex of *P. dobsoni*, described above, as it differs in the form of the postabdominal segment, which is rounded at its antero-lateral angle, in the existence of spines on the lateral margins of the last postabdominal segment, &c. The median dorsal carina is prolonged to the posterior margin of the cephalothorax; and there is a raised lateral line on each side, extending from a point immediately above the antennal spine halfway to the posterior margin.

If the genus *Xiphopeneus* of Smith (Trans. Conn. Ac. ii. p. 26, 1871) be sustained, it will probably be necessary to refer this species to it, as it agrees in the form of the rostrum, and in the length of the legs of the fifth pair, although the dactylus is quite short.

PENÆUS KRÖYERI.

Peneus kröyeri, Heller, Wien. Akad. Wissensch. Sitzungsab. xlv. (Abth. i.), p. 425, pl. ii. fig. 51 (1862).

Xiphopeneus harttii, Smith, Trans. Conn. Ac. ii. p. 28, pl. i. fig. 1 (1871).

I have little hesitation in referring the *Xiphopeneus harttii* of Smith, from Caravelhas, Bahia, to the previously described *P. kröyeri* of Heller, from Rio Janeiro. A comparison of the figures and descriptions will, I think, suffice to establish their identity; and there is a specimen from the West Indies in the British-Museum collection which appears to belong to the same species. The genus *Xiphopeneus* was characterized by its author mainly by the long and slender antennules (which have a small lamelliform appendage which is not foliaceous and expanded over the eye as in *Penæus*), the form of the cephalothoracic sulci, and the great length of the fourth and fifth thoracic legs (which have the terminal joints slender and flagelliform or, rather, styliform). The mouth-organs, antennæ, &c. are not different from those of *Penæus*.

It will be seen that these characters are not of greater value than those which distinguish the *Penæi* of Milne-Edwards's first and second sections (which have never been considered of generic importance). Moreover the length of the posterior legs is certainly a character that varies in the different species; and in one (*P. styliferus*) already referred to, which agrees in most of its characters with *Xiphopeneus*, the dactylus of the fifth pair of legs is quite short. Nor do we know at present how far these peculiarities are dependent upon the sex of the animals (the specimens of *P. kröyeri* and *P. styliferus* in the Museum collection are both males).

If the genus *Xiphopeneus* be retained as distinct, it will be necessary to constitute more than one other new generic division for species hitherto included in *Penæus*; and as the materials at present existing

in the British-Museum collection do not enable me to adopt this course, as many species are not as yet represented in it, I have, in the synopsis of the species given below, and until a more complete revision of the genus shall have become possible, included the species in *Penæus*.

Synoptic Table of the Species of Penæus.

The object of the following analytical Table is to indicate the principal external characters by which the species of *Penæus* may be distinguished. There are certain species which have not been described with sufficient detail to allow of their incorporation in the list; these are either previously referred to, or are mentioned by Milne-Edwards in the 'Histoire Naturelle des Crustacés.' The species of which there are no specimens in the British-Museum collection, and which are therefore unknown to me, are distinguished by an asterisk.

- I. Antennules with both flagella extremely short. Two deep longitudinal sulci extending along the whole length of the cephalothorax, adjacent to the rostrum and the median carina, which is itself deeply sulcate. (A supraorbital spine present.)

First and second pairs of legs bispinose, third pair unispinose at base. Seventh postabdominal segment with lateral marginal spines.

1. *P. caramote*, Risso.

European.

First pair of legs bispinose, second pair unispinose, third pair unarmed at base. Terminal segment without lateral marginal spines.

2. *P. brasiliensis*, Latr.

Atlantic region.

First and second pair of legs unispinose, third pair unarmed at base. Terminal segment with lateral marginal spines.

3. *P. canaliculatus*, Oliv.

Indo-Pacific region.

- II. Antennules longer. No lateral sulci on the cephalothorax, bordering the rostrum and median carina. (Supra-orbital spine usually absent.)

A. *Rostrum much longer than the eyes, reaching nearly to, or beyond, the end of the antennal scale.*

a. *Carapace with a ridge extending backward from the origin of the rostrum to, or nearly to, the posterior margin of the cephalothorax.*

§ *The carina between the base of rostrum and posterior margin sulcate, and reaching to the posterior margin.*

First pair of legs bispinose, second pair unispinose, third pair unarmed at base. Rostrum $\frac{7-8}{3}$ -dentate, third to sixth postabdominal segments keeled.

4. *P. semisulcatus*, De Haan.

Japan, Indo-Pacific region.

First and second pairs of legs unispinose, third pair unarmed at base. Rostrum $\frac{8-9}{0}$ -dentate, curved upward toward the apex; third to sixth postabdominal segments keeled.

5. *P. hardwickii*, Miers.

Indian Seas.

Rostrum $\frac{9}{0}$ -dentate, slightly ascending toward the apex. All the postabdominal segments keeled.

*6. *P. sculptilis*, Heller.

Java.

§§ *The carina between the base of rostrum and posterior margin of the cephalothorax not sulcate, and often not reaching to the posterior margin.*

* *Rostrum with the inferior margin dentate. (No lateral spines on last post-abdominal segment.)*

Rostrum $\frac{9-10}{1-2}$ -dentate. Terminal segment ending in a long spine.

*7. *P. setiferus*, Linn.

West Indies, east coast of North America.

Rostrum $\frac{6-7}{3}$ -dentate, not reaching beyond the antennal scale. Terminal segment acute.

8. *P. monodon*, Fabr.

Indian and Australian Seas.

Rostrum very slender and styliiform in its distal half, $\frac{8-9}{4-5}$ -dentate and reaching slightly beyond the antennal scale.

9. *P. indicus*, M.-Edw.

Indo-Malayan Seas; Panama?

** *Rostrum with the inferior margin entire.*

1. *Rostrum not reaching far beyond the end of the antennal scale.*

Rostrum ensiform, straight, 8-10-dentate above, the teeth extending along nearly the whole upper margin. Terminal postabdominal segment without lateral marginal spines.

10. *P. monoceros*, Fabr.

Indo-Malayan Seas.

Rostrum curved upward toward apex, 8-dentate above, dorsal carina reaching nearly to the posterior margin. Terminal segment as in *P. monoceros*.

*11. *P. curvirostris*, Stimpson.

Japan, Simoda.

Rostrum robust, curved slightly upward, 8-9-dentate above, the last tooth situated on the dorsal carina at considerable distance from the preceding. Terminal segment with a pair of lateral spines.

12. *P. membranaceus*, Risso.

Mediterranean, Madeira.

Rostrum styliiform at apex, nearly straight, 7-9-dentate above in its proximal half. Terminal segment without lateral marginal spines; 5th legs (in the female) rudimentary.

13. *P. dobsoni*, Miers.

West Coast of India.

Rostrum slender, styliiform and produced at apex, 6-9-dentate above at its base. Terminal segment with prominent lateral marginal spines; 5th legs (in the male) long and slender, dactylus small.

14. *P. styliiferus*, Edw.

Bombay.

2. *Rostrum reaching far beyond the end of the antennal scale.*

Rostrum 9-10-dentate above; the 3-4 last teeth placed upon the slender styliiform distal half. Last postabdominal segment with lateral spines.

*15. *P. foliaceus*, Risso.

Mediterranean.

Rostrum 6-dentate above, the styliiform distal portion without teeth. Terminal segment without lateral spines.

16. *P. kröyeri*, Heller.

Brazil West Indies.

b. *Cephalothorax without any median dorsal ridge. (Rostrum entire below.)*

Rostrum straight, dentate nearly to its apex; first tooth separated by a

wider interval than the preceding. Cephalothorax and postabdomen tomentose. Terminal segment not carinate, with minute lateral spines.

17. *P. affinis*, Edw.

Indo-Pacific region.

Rostrum and cephalothorax as in *P. affinis*. Postabdomen naked. Terminal segment with the deep longitudinal median sulcus defined by lateral carinæ, and with lateral spinules.

18. *P. constrictus*, Stimpson.

East Coast United States.

Rostrum somewhat sinuated, 9-dentate above, with the teeth equidistant. Terminal segment without lateral spines.

*19. *P. tenuis*, Dana.

North Patagonia.

Rostrum styliform toward apex, nearly straight, 6-dentate above near its base; the last tooth separated by a wider interval. Terminal segment without lateral marginal spines.

*20. *P. avirostris*, Dana.

Singapore.

B. Rostrum very short, not reaching beyond the eyes.

* Rostrum slender.

Eye-peduncles long. Rostrum not half as long as the eyes, 7-dentate above.

*21. *P. podophthalmus*, Stimpson.

Hong Kong.

Eye-peduncles of moderate length. Rostrum a little shorter than the eyes, 5-dentate above.

*22. *P. gracilis*, Dana.

Sooloo Sea.

Eye-peduncles thick. Rostrum scarcely reaching beyond them, 8-9-dentate above. (5th? legs greatly elongated, with the dactylus nearly half as long as the cephalothorax.)

*23. *P. stenodactylus*, Stimpson.

Hong Kong.

** Rostrum laminiiform, high, and laterally compressed.

Rostrum 9-10-dentate above. Flagella of the antennules half as long as the peduncle.

*24. *P. lamellatus*, De Haan.

Japan.

Rostrum 6-dentate above. Flagella of the antennules about as long as the peduncle.

*25. *P. brevicornis*, M.-Edw.

Indian Seas.

ARISTEUS EDWARDSIANUS. (Plate XVII. fig. 3.)

Penæus edwardsianus, Johnson, P. Z. S. 1867, p. 897.

The typical example of this very fine species is in the collection of the British Museum; and I have little hesitation in referring it to the genus *Aristeus* of Duvernoy (Ann. Sci. Nat., sér. 2, Zool. xv. p. 101, 1841). The character principally relied upon by Duvernoy for the distinction of the genus was derived from the ramose structure of the branchiæ, which he conceived were formed upon a different type from that found in other genera of the Caridea; but I am able, from an examination of the branchiæ of *A. edwardsianus*, to confirm Dana's observation that they do not differ essentially in struc-

ture from those of the species of *Penæus*. There are, however, other points in which the genus *Aristeus* differs from *Penæus*, and which seem to warrant the retention of Duvernoy's generic name. The two flagella of the antennules are very unequal; one is extremely short, the other remarkably long, as long as the animal itself; the palpi of the mandibles are robust, not foliaceous and membranaceous, as in *Penæus*; the fifth pair of legs is very long and slender, not shorter than the preceding pair; the first pair of postabdominal appendages terminate in a single ramus, the second ramus being rudimentary or entirely absent. I may add that the anterior margin of the first postabdominal segment does not form an angle with the lateral margins, as usual in *Penæus*, but the antero-lateral angles are rounded.

Duvernoy established the genus upon specimens from Nice, which he referred, no doubt correctly, to the *Penæus antennatus* of Risso (Hist. Nat. Eur. Mérid. v. p. 68, 1826).

P. edwardsianus resembles in general appearance the figure of *P. antennatus* given by Duvernoy; but the carapace is marked with strong ridges upon the hepatic, pterygostomian, and branchial regions, the last postabdominal segment is not sulcate above, and the rami of the postabdominal appendages, especially of the first pair, are much longer. There are also some marked differences in the mouth-appendages which can scarcely be due to inaccurate drawing of the details of *Aristeus antennatus*; the palpus of the mandible in *A. edwardsianus* is much more robust than in the Mediterranean species, is densely hairy, and the third joint is bilobate; the exognath of the second pair of maxillipedes is very long, reaching beyond the end of the antennal scale, and more than twice the length of the endognath itself, while that of the third pair of maxillipedes is quite short.

The specimen is a female.

The genus *Xiphopeneus* of Smith (referred to above) resembles *Aristeus* in the form of the carapace and rostrum, and length of the posterior legs and postabdominal appendages; but there does not exist the marked disparity in length in the flagella of the antennules, nor is it stated that the mandibular palpi and rami of the first pair of postabdominal appendages differ from those of the ordinary *Penæi*.

FUNCHALIA WOODWARDI.

Funchalia woodwardi, Johnson, P. Z. S. 1867, p. 896.

The mouth-organs of the unique example of this remarkable form (which is in the British-Museum collection) have not been dissected; but the long, corneous, and somewhat sickle-shaped processes of the mandibles are plainly visible, and suffice to establish its generic distinctness; the "broad lamellar appendage" at each side of the mouth, referred to by Mr. Johnson, is evidently the foliaceous palpus of the mandible, the terminal joint of which is large and truncated at its distal extremity.

The specimen is a female.

SICYONIA FURCATA, sp. n. (Plate XVII. fig. 4.)

This species, in the form of the body, closely resembles *Sicyonia ocellata*, Stimpson (Proc. Ac. Nat. Sci. Phil. p. 43, 1860), of which young specimens from Hong Kong, presented by the Smithsonian Institution are in the British-Museum collection, and also one fully adult from Ceylon, presented by E. W. H. Holdsworth, Esq. As in *S. ocellata*, the dorsal carina is very convex and strongly dentate, the cephalothorax tomentose, and the first to sixth postabdominal segments deeply channelled and without spines on the lateral margins. The terminal segment, however, is of very different form, being furcate at the extremity, the lobes of the fork divergent, acute at apex and deeply channelled above, the inner and outer margins carinate and ending in small subterminal spines on each lobe of the fork. In *S. ocellata* the last postabdominal segment is simple and acute at apex.

Hab. Sooloo Islands.

A single adult example is in the collection. This specimen, and also those of *S. ocellata* that I have seen, appear to be of the female sex.

EXPLANATION OF PLATE XVII.

Fig. 1. *Penæus hardwickii* (p. 300), lateral view, natural size.

1 *a.* Terminal segment and uropoda of the same, natural size.

2. *Penæus dobsoni* (p. 302), lateral view of cephalothorax, natural size.

2 *a.* Mandible, magnified.

2 *b.* Second maxilla, magnified.

2 *c.* First maxillipede, magnified.

2 *d.* Second maxillipede, magnified.

2 *e.* Third maxillipede, magnified.

2 *f.* Part of the ventral surface of the cephalothorax of a male individual, showing the form and position of the fifth pair of legs (from a specimen lent by Prof. J. Wood-Mason, see note p. 303).

2 *g.* The same view of a female, showing the rudimentary and indurated condition of the fifth pair of legs.

3. Exognath of the mandible of *Aristeus edwardsianus* (p. 308), natural size.

4. *Sicyonia furcata* (p. 310), lateral view, natural size.

4 *a.* Terminal segment and uropoda of the same, magnified.

4. Description of a new Genus of Land Shells belonging to the Family Cyclophoridæ. By GEORGE FRENCH ANGAS, C.M.Z.S., F.L.S., &c.

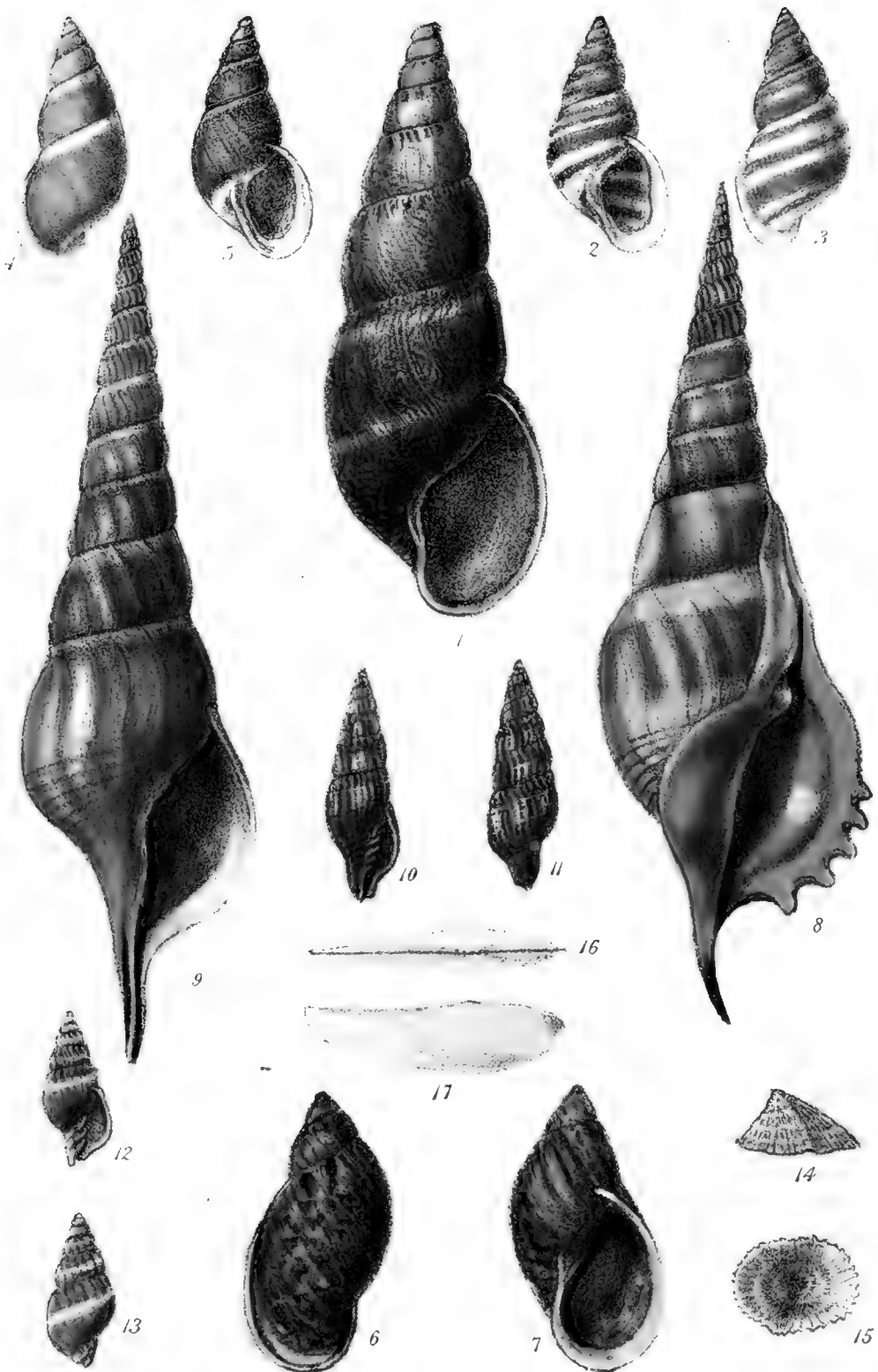
[Received Feb. 16, 1878.]

Genus MASCARIA, Angas.

Operculum horny, ovate, pointed above; whorls few; nucleus situated near the base of the columellar margin.

Shell rimate, elongately ovate, conically turreted, nearly smooth or faintly longitudinally striated; aperture ovate, rounded below and angulate above; peristome continuous, single; outer lip thickened and slightly expanded.

1911
JAN 10
NATURAL HISTORY



J. Sowerby lith

Hanhart imp.

NEW SHELLS FROM KURRACHI, MADAGASCAR,
ECUADOR & AUSTRALIA

I have established this genus for the reception of certain species of land shells that have hitherto been included in the genus *Megalomastoma* of Guilding, a natural West-Indian group, from which, however, they appear to me to differ so greatly in several important characters that I do not hesitate to separate them from the *Megalomastomata* as a distinct natural group, having its habitat in Madagascar and the Mascarene Islands.

The type of my genus *Mascaria* is the *Cyclostoma croceum* of Sowerby, which has been placed in the genus *Megalomastoma* by H. & A. Adams, Pfeiffer, Troschel, and other authors. With it must be included a species recently described by M. Morelet, in the 'Journal de Conchyliologie' (tome xvii. No. 2, April 1877), under the name of *Megalomastoma litteratum*.

Mascaria crocea is peculiar to the Mauritius, where it was found alive by Sir David Barclay on the hills in the neighbourhood of Black River. *M. litterata* is from Madagascar, and was collected there in some abundance by Mr. Waters.

5. Descriptions of nine new Species of Land and Marine Shells from various localities. By GEORGE FRENCH ANGAS, C.M.Z.S., F.L.S., &c.

[Received February 16, 1878.]

(Plate XVIII.)

BULIMUS WATERSI, n. sp. (Plate XVIII. fig. 1.)

Shell imperforate, elongately turreted, rather thin, shining, finely irregularly longitudinally striated, the striæ here and there forming tessellated rows and patches, pale olive, lighter towards the apex, mottled with small brown spots and irregular markings, with indications of two paler bands, one below the suture, and the other towards the base of the last whorl; spire acuminate, somewhat obtuse at the apex; whorls 9, rather convex, the last of equal length with the spire; sutures impressed and slightly crenulate; aperture subovate, one third the length of the shell, pale violet within; outer lip simple, scarcely thickened at the edge; columella with a slight callus below, a little arcuate towards the base.

Alt. 3 inches, diam. 11 lines; length of aperture 1 inch.

Hab. Madagascar.

This species is allied to *B. obtusatus*, Gmel., and *B. moreleti*, Desh., with which, including perhaps *B. clavator*, Petit, and *B. balstoni*, Angas, it combines to form a natural group of Madagascar *Bulimi*. The specimen from which my description is taken is in the collection of Sir David Barclay. There is a second example in that of Mrs. De Burgh.

I would here correct the name of a species in the list I gave in the Society's 'Proceedings' for 1877 (p. 527), of certain land shells from the Island of Madagascar that had been submitted to me by Mr.

Edward Bartlett. For *Helix cornu-giganteum*, Chemn., read *H. questieriana*, Crosse (see Journ. de Conchyliologie, 1868, p. 269, pl. ix. fig. 4). A large series of specimens of this latter species were sent home lately from Madagascar by Mr. Waters; and although I observed certain peculiarities about them on comparing them with typical specimens of *H. cornu-giganteum*, I then hesitated to separate them from the latter species, regarding them as possibly a local variety, and not being aware at the time that they had been elevated to the rank of a species by M. Crosse. I have now great pleasure in adopting that gentleman's name.

Helix questieriana differs from *H. cornu-giganteum*, Chemn. (= *H. vesicalis*, Lam.), in being somewhat smaller, paler in colour, and more tumid, with the base less flattened and the umbilicus concealed by a callus, and especially by having the inner lip constantly more or less *granulated*—a character that I do not see referred to in the description of the shell in the French Journal.

BULIMUS (OTOSTOMUS) QUADRIFASCIATUS, n. sp. (Plate XVIII. figs. 2, 3.)

Shell elongately ovate, rimate, moderately solid, shining, finely longitudinally striated, white, transversely banded with light brown, the last whorl with four bands, the central one being the widest; spire conical, apex obtuse; whorls 6, somewhat convex; aperture oval, equal to the spire; outer lip flattened and expanded at the base.

Alt. 1 inch 3 lines, diam. $6\frac{1}{2}$ lines.

Hab. Ecuador.

BULIMUS (OTOSTOMUS) NAPO, n. sp. (Plate XVIII. figs. 4, 5.)

Shell rimate, ovately fusiform, moderately solid, shining, very finely and irregularly striated, pale fawn-colour, with a narrow white band next below the suture and a similar white band surrounding the perforation; spire sharply conical, somewhat obtuse at the apex; whorls 6, slightly convex; aperture ovate, same length as the spire; outer lip expanded and flattened at the base, white behind, bordered by a narrow suffused orange band.

Alt. 1 inch 3 lines, diam. $5\frac{1}{2}$ lines.

Hab. Ecuador.

BULIMUS (EURYTUS) EROS, n. sp. (Plate XVIII. figs. 6, 7.)

Shell imperforate, oblong-ovate, thin, very finely and closely shagreened all over, the apical whorls marked with irregular longitudinal striæ, light-greenish olive, ornamented with small spots and cloudy patches of a darker colour; spire very short, apex obtuse, pink; whorls 4, rather convex, the last very large; aperture ovate, more than two thirds the length of the shell, effuse below; outer lip slightly expanded and reflexed, which, together with the columella and the interior of the aperture, is of a bright rose-colour.

Alt. 1 inch $5\frac{1}{2}$ lines, diam. 8 lines.

Hab. Ecuador.

A beautiful species, characterized by its closely granulated sculpture, and the rosy coloration of the mouth.

ROSTELLARIA LUTEOSTOMA, n. sp. (Plate XVIII. figs. 8, 9.)

Shell fusiform, solid, light brown, paler below the sutures; spire attenuated, apex sharp-pointed; whorls 15, the first 9 or 10 longitudinally strongly plicate, those nearest the apex being cancellated with fine transverse ridges, the lower whorls nearly smooth, with a few concentric grooves near the base or the last whorl; columella covered with a strong tumid polished callus; outer lip with 5 digitations on the lower half of the margin; posterior canal extending upwards beyond the centre of the third whorl; beak moderate, nearly straight in the young shell, somewhat curved outwards in the adult; aperture golden yellow, deepest on the lower portion of the columella.

Length 4 inches 3 lines, diam. 1 inch 3 lines.

Hab. Kurrachi, near the mouth of the Indus.

This beautiful shell forms an interesting addition to the restricted genus *Rostellaria* (*Gladius* of Klein), of which hitherto only about half a dozen recent species have been described.

All the known species inhabit the Asiatic seas, none having been met with in any part of the New World. The two examples (one young and the other in the adult state) from which I have taken my description, are from the collection of Sir David Barclay, and are, so far as I am aware, unique in this country.

MITRA (*COSTELLARIA*) *LINCOLNENSIS*, n. sp. (Plate XVIII. figs. 10, 11.)

Shell acuminate fusiform, solid, whitish, tinged with irregular longitudinal chestnut flames, with a narrow band of interrupted spots encircling the centre of the whorls, the lower half of the last whorl chestnut, with a faint band of reticulated brown and white spots in the middle; whorls 7, a little convex, with numerous, stout, rounded longitudinal ribs, which are slightly nodulous below the sutures; interstices smooth, sutures impressed; spire longer than the aperture; outer lip simple, a little contracted below; columella with 4 strong plaits, the posterior one the largest: basal canal short, slightly re-curved.

Length 7, breadth 2 lines.

Hab. Port Lincoln, South Australia.

MITRA SCHOMBURGKI, n. sp. (Plate XVIII. figs. 12, 13.)

Shell ovately fusiform, moderately solid, strongly longitudinally ribbed, the ribs becoming nearly obsolete towards the lower portion of the last whorl, livid brown, with a broad pale suffused band on each whorl and four narrow dark brown lines encircling the last whorl, one above and three below the band; whorls $6\frac{1}{2}$, convex; spire turreted; sutures impressed; aperture subovate, equal in length to the spire; outer lip simple, arcuate, sulcate internally;

columella with three stout plaits, which are carried round the base of the last whorl.

Alt. 5, diam. 2 lines.

Hab. South Australia.

SIPHONARIA ALBIDA, n. sp. (Plate XVIII. figs. 14, 15.)

Shell elongately ovate, subsymmetrical, sharply conical, rather thin, white; ribs very numerous, rounded, unequal, crossed more or less with squamose ridges; apex subcentral, prominent, smooth, recurved; siphuncle inconspicuous; interior white, shining, almost pearly.

Long. 8, lat. 6, alt. $3\frac{1}{2}$ lines.

Hab. St. Vincent's Gulf, South Australia.

A pure-white conical species, with the ribs very numerous and crossed with irregular squamose ridges.

LEDA (ADRANA) NEWCOMBI, n. sp. (Plate XVIII. figs. 16, 17.)

Shell equivalve, very inequilateral, flattened, lanceolate, the posterior side obtusely angled, the anterior terminating in a point slightly curved upwards, thin, shining, white, sculptured with very fine, regular, close-set concentric striæ, which on the posterior side extend nearly to the margin of the valves, whilst anteriorly they cease abruptly, leaving about one third of the surface smooth, faintly marked with the lines of growth only; front dorsal margin very slightly concave, two thirds the length of the shell; ventral margin somewhat arcuate behind, flattened below, and again slightly arcuate towards the anterior extremity; beaks very small, approximate, incurved.

Length 1 inch 4 lines, alt. 4 lines, lat. $2\frac{1}{4}$ lines.

Hab. Dredged in Navy Bay, Aspinwall, in 8 fathoms (*Dr. W. Newcomb*).

I have much pleasure in dedicating this new species of *Adrana* to my old friend and correspondent Dr. W. Newcomb, of Ithaca, a distinguished American conchologist.

EXPLANATION OF PLATE XVIII.

Fig. 1. *Bulimus watersii*, p. 311.

2, 3. — *quadrifasciatus*, p. 312.

4, 5. — *napo*, p. 312.

6, 7. — *cros*, p. 312.

8, 9. *Rostellaria luteostoma*, p. 313.

Fig. 10, 11. *Mitra lincolnensis*, p. 313.

12, 13. — *schomburgki*, p. 313.

14, 15. *Siphonaria albida*, p. 314.

16, 17. *Leda newcombi*, p. 314.

6. Additional Notes on the Chiroptera of Duke-of-York Island and the adjacent Parts of New Ireland and New Britain¹. By G. E. DOBSON, M.A., M.B., F.L.S., &c.

[Received Feb. 18, 1878.]

The following notes are derived from an examination of a second collection of Chiroptera, consisting of forty-five specimens, recently

¹ See P. Z. S. 1877, p. 114.

sent home by the Rev. G. Brown, C.M.Z.S., and kindly placed in my hands by Mr. P. L. Sclater, Secretary of the Society.

This second collection contains no species which were not represented in the first; but the opportunity afforded of examining additional specimens of certain species enables me to correct and add to the notes published in my first paper, and to show that the Chiropterous fauna of Duke-of-York Island is even more characteristic of the Australian region than there stated.

PTEROPUS MELANOPOGON, var. *NEOHERNICUS*.

Pteropus melanopogon, var. *neohibernicus*, Peters, Monatsb. Akad. Berl. 1876, p. 317.

Three specimens, an adult female with forearm 7''·3, one younger with forearm 7''·0, and one quite immature with forearm 6''·5. All have the ear one inch in length, and quite similar in shape to that of typical examples of *Pt. melanopogon* from the Malay archipelago. The index finger appears to be remarkably long, probably proportionally longer than in any other species of the genus. In the largest specimen (with forearm 7·3 inches) it is 5·8, the metacarpal bone of the middle finger being 5·1, while in a full-grown specimen of *Pt. melanopogon* from Bouru (with forearm 7''·75), in which the metacarpal of the middle finger is 5''·2, the index finger measures 5''·5 only. In all the specimens the second upper premolar is separated by a rather narrow space from the canine, and the premolars and molars are very large, but with scarcely developed internal cusps, and no trace of basal projections. In the older female the fur is very short, and almost bright yellowish brown throughout, the back of the head and across the shoulders brighter than the rest of the body, on the thighs brown, the fur of the face and throat of a reddish brown shade, but no trace of a black patch of hairs beneath the chin and throat. In the younger female the fur is much longer and darker, but, as in the older specimen, it is reduced to a narrow line about an inch wide along the centre of the back; the face about the eyes, the cheeks, and under the muzzle and throat reddish brown, the whole under surface paler reddish brown; the back of the head bright yellow; the neck above and on the sides light yellowish brown, shoulders brighter; the narrow line along the centre of the back bright yellowish, edged with dark brown, which colour extends upon the hairs clothing the thighs. The immature specimen rather resembles the older one; but the back of the head is paler yellow, the face and chin darker brown, and the fur along the back is much broader and almost uniformly light brown.

PTEROPUS CAPISTRATUS.

Pteropus capistratus, Peters, Monatsber. Akad. Berl. 1876, p. 316 (with a coloured plate); Dobson, Proc. Zool. Soc. 1877, p. 116.

A single female specimen, not differing from those previously described; the black ring surrounding the muzzle between the ears

and eyes very conspicuous where it passes round the lower jaw in front of the throat.

CYNOHYCTERIS BRACHYOTIS.

Cynonycteris brachyotis, Dobson, P. Z. S. 1877, p. 116.

A large number of specimens representing all ages of this animal; so that the full size of the species can be determined with considerable certainty. This scarcely differs from that given in my original description. In the largest specimen, an adult male, the forearm is 2·9 inches, or only one twentieth of an inch longer than that of the type. In all, the peculiar nakedness of the shoulders is present, and the fur of the sides of the neck radiates from a central point near the place of origin of the antebrachial membrane, corresponding to the position of neck-glands, which, in the adult male referred to above, are covered on each side by a circular tuft of coarse yellow hairs, as in most of the species of the genus *Pteropus*. The colour of the fur is very similar in all, being greyish yellow-brown, the base of the hairs darker; in the immature specimens the fur is longer and darker throughout. In all, except the oldest individuals, there is a minute first upper premolar between the approximated canine and second premolar, generally so small as to be seen with difficulty.

CEPHALOTES PERONII.

Cephalotes peronii, Geoffroy, Ann. du Muséum, xv. p. 104 (1810).

More than one third of the whole collection consists of specimens of this species, which, therefore, appears to be very abundant in these islands.

From the young with milk-dentition to the aged with worn teeth, all have the back equally naked from the shoulders backwards. They correspond closely in measurements and other respects with specimens from other parts of the Austro-Malayan subregion, of which this species is eminently characteristic.

MELONYCTERIS MELANOPS.

Melonycteris melanops, Dobson, P. Z. S. June 1877, pp. 119–121, figs. 4–7, and pl. xvii.

Pteropus (Cheiropteruges) alboscapulatus, Ramsay, Proc. Linn. Soc. New South Wales, July 1877, p. 17.

An adult female, scarcely differing in the colour of the fur from those previously described, having also the white spot near the place of origin of the antebrachial membrane from the shoulder. The canines appear to be as large as in the male. The wings are attached posteriorly, as in other specimens, to the base of the third toe, or to the space between the bases of the second and third toes.

This is undoubtedly the species described under the name of *Pteropus (Cheiropteruges) alboscapulatus* by Mr. Pierson Ramsay in

the publication referred to above, as may be seen by comparing the descriptions. In my original description of this species, I did not notice the white spot on the shoulder, very correctly described by Mr. Ramsay, as it was completely concealed from view in the specimens examined by me (owing to the manner in which the dry skins were preserved, the wings being brought forward in front of the head); nor have I referred to the yellow spots on the wings, which, as they do not appear in this specimen, may be accidental.

PHYLLORHINA TRICUSPIDATA.

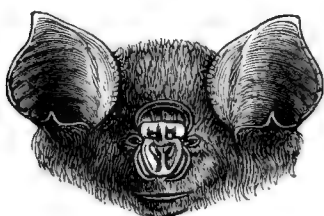
Rhinolophus tricuspidatus, Temm. Monogr. Mammal. ii. p. 20, pl. 32. figs. 11, 12 (1835-41).

An immature specimen with light-brown fur, of a dull shade throughout, very different from the bright reddish brown fur of the adult individual from the same locality referred to in my former paper.

PHYLLORHINA CERVINA.

Rhinolophus cervinus, Gould, Mammals of Australia, iii. pl. xxxiv. (1853).

A careful examination of the additional specimens in this collection has shown me that I was mistaken in referring to *Ph. galerita*, Cantor, of the Oriental region, a single specimen in the first collection, which really belongs to the Australian representative of that



Phyllorhina cervina.



Phyllorhina galerita.

species. Recent specimens, and specimens preserved in alcohol, of this Australian species (*Ph. cervina*, Gould) are readily distinguished from the closely allied *Ph. galerita* by the much larger frontal glandular sac in adult males, by the much narrower anterior portion of the horizontal horseshoe-shaped nose-leaf (compare the woodcuts above), and by the much greater length of the calcaneum. In dried skins, however, these parts become so altered in appearance that it is almost impossible to distinguish the species.

PHYLLORHINA CALCARATA.

Phyllorhina calcarata, Dobson, P. Z. S. 1877, p. 122, fig. 8.

A specimen of an immature individual with (as in the type) vertical ridges dividing the concave front surface of the transverse erect

portion of the nose-leaf, and having also the last caudal vertebra free.

Ph. coronata, Peters, from the Philippine Islands, approaches this species in size and in the remarkable length of the calcaneum; but the very different form of the nose-leaf and ears at once distinguishes it.

7. On *Latrunculus* and *Crystallogobius*, two remarkable Forms of Gobioïd Fishes. By ROBERT COLLETT, of Christiania, C.M.Z.S.

[Received February 18, 1878.]

Upon different occasions, at meetings of the Scientific Society of Christiania, I have communicated my observations on a singular group of our Gobioïd fishes, which differ from the typical genus *Gobius* not only in the almost perfect transparent body, but also in differences in the structure of the scales, fins, and the form of the body¹.

As the said group in several points offers much of interest, I will endeavour to relate the general results of these researches, all of which have been made in the Christiania fjord, a most favourable locality for marine fishes and invertebrates. From these researches I find :—

1. Each of the genera, *Latrunculus*, Günth., 1861, and *Crystallogobius*, Gill, 1863, include one single species, *L. pellucidus* (Nardo) 1824, and *C. nilssoni* (Düb. & Kor.) 1844.

2. *Latrunculus pellucidus* (Nardo) from the Mediterranean, *L. pellucidus* (Kessler) from the Black Sea, *L. albus* (Parn.) from Scotland, and *L. stuwitzii* (Düb. & Koren) from Norway are all one and the same species.

3. The males of both species have a dentition totally different from that of the females; in *L. pellucidus* these teeth are only developed during the spawning-season.

4. The female of *C. nilssonii* has the first dorsal and the ventral fins rudimentary; and the ovaries of this species reach back far behind the vent.

5. Both species are *annual* vertebrates, and accomplish their life in the course of one year.

Genus LATRUNCULUS, Günth.

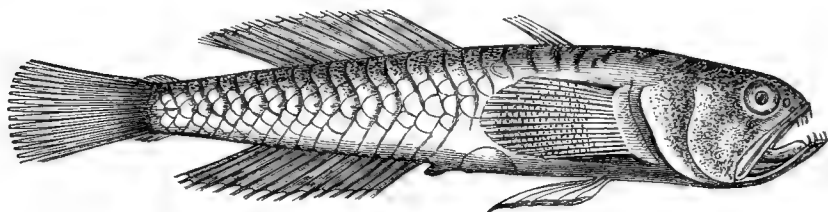
Genus *Latrunculus*, Günth. Cat. Acanth. Fishes, Brit. Mus. vol. iii. p. 80 (1861).

Body transparent, elongate, rather compressed, covered with large, deciduous, rounded scales attached to parallel muscular impressions. Both sexes dentiferous, the mature male with a series of long teeth,

¹ Slægten *Latrunculus* og dens nordiske Arter (Forh. Vid. Selsk. Christ. 1872). Norges Fiske, med Bemærkninger om deres Udbredelse (Tillægsh. til Forh. Vid. Selsk. Christ. 1874). Om Slægterne *Latrunculus* og *Crystallogobius* (Forh. Vid. Selsk. Christ. 1876).

and with strong canine teeth, which form the hinder series in the upper jaw. Two separated dorsal fins, the first composed of 5 spines. Ventral fins united, gill-openings rather wide. Pseudo-branchiæ present.

Fig. 1.



Latrunculus pellucidus ♂ ad., in the breeding-season, ♀.

L. PELLUCIDUS (Nardo).

1824. *Gobius pellucidus*, Nardo, Giorn. Fis. Chim. Stor. Nat. Pavia, tom. iii. Osserv. p. 7 (*teste* Günther).

1826. ? *Aphia meridionalis*, Risso, Hist. Nat. Eur. MÉR. tom. iii. p. 287 (Paris, 1826).

1837. *Gobius albus*, Parn. Trans. Roy. Soc. Edinb. vol. xiv. p. 137, Feb. 1837 (Edinb. 1840).

1844. *Gobius stuwitzii*, v. Düb. & Kor. Kgl. Vet. Akad. Förhandl. 1844, p. 51, tab. ii. fig. 4 (Stockh. 1846).

1859. *Gobius pellucidus*, n. sp., Kessl. Bull. Soc. Nat. Mosc. 1859, tom. xxxii. No. 2, p. 260 (Mosc. 1859).

1861. *Latrunculus albus*, Günth. Cat. Acanth. Fish. Brit. Mus. vol. iii. p. 80, and p. 556 (Lond. 1861).

1861. *Latrunculus pellucidus*, Günth. Cat. Acanth. Fish. Brit. Mus. vol. iii. p. 556 (Lond. 1861).

1861. *Gobiosoma stuwitzii*, Günth. Cat. Acanth. Fish. Brit. Mus. vol. iii. p. 86 (Lond. 1861).

1863. *Boreogobius stuwitzii*, Gill, Proc. Acad. Nat. Sci. Philad. 1863, p. 269 (Philad. 1864).

1872. *Latrunculus stuwitzii*, Coll. Forh. Vid. Selsk. Christ. 1872, p. 9 (Christiania, 1873).

Teeth in the mature male long and cylindrical, and with strong curved canine teeth in both jaws; teeth in the female and the immature male minute. The ventral fins united to a funnel, with the longer rays towards the body. The ovaries do not project behind the vent.

D¹ 5, D² 13 (12); C. 10+17+10; A. 14; V. 6; P. 16;
 Lin. lat. 25; Vertebr. 27; M. Br. 5.

A. Remarks on the Synonymy.

The first northern form of the transparent Gobioids was discovered by Parnell in the Scottish friths, and shortly described in Feb. 1837, in the 14th volume of the Trans. of the Royal Society of Edinburgh, under the name of *Gobius albus*. His description (which, by the way,

is rather incomplete) has afterwards, without any further addition, been repeated in the various editions of Yarrell's History of Brit. Fishes. In May, 1844, Von Düben and Koren in Öfv. Kgl. Vet. Akad. Förh. for the same year introduced two other species of the same group, both of which had been previously found, in Dec. 1834, in the district of Bergen, Norway, by the late naturalist, Mr. P. Stuwitz, after whom one of them was named *Gobius stuwitzii*. The last-named species had certainly, as pointed out by the authors, a decided similarity to the Scottish *G. albus*. Still the difference in the construction of the body, as well as of the teeth, was so obvious that they could not easily be mistaken. Instead of being plump, like *L. albus*, with the head thick, the cleft of the mouth wide, the teeth long, the interorbital space wide, the second dorsal and the anal fins even, *G. stuwitzii* was slender, with the head thin, and the cleft of the mouth short, the teeth extremely feeble, the interorbital space narrow, and the second dorsal and the anal fins diminishing behind. In 1861, Dr. Malm, in Bohuslän, Sweden, found both the named species in fully developed state, one of them (*G. stuwitzii*) with ripe spawn; and he therefore gave, in July 1863, in the Förh. Skand. Naturf. 9. Möte, comparative diagnoses of them, chiefly based upon the structure of the teeth and the vertical fins.

When Dr. Günther, in 1861, issued the volume of his Catalogue of the Fishes of Brit. Museum, in which he treats of the Gobioids, *G. albus* was made the type of the new genus *Latrunculus*¹; but, from the description of *G. stuwitzii*, he did not venture to include this under the same genus; for want of a better place he inserted it under the genus *Gobiosoma*, Gir., as it was still undecided that it possessed scales, which, for the first time, was proved by Dr. Malm in 1863. Prof. Gill, in the Proc. Acad. Nat. Sci. of Philadelphia for 1863, even made it a type for a new genus *Boreogobius*, without giving even a single word of reason for this alteration; and Dr. Bleeker, in 1874, followed in his steps in the Synopsis of the Gobiidæ, which he communicated in the 9th volume of Arch. Néerl. Sci. Exact. et Nat.

Since the autumn of 1871, I have found the form *L. stuwitzii* in the Christiania fjord in great numbers, and have collected innumerable specimens during the autumn months. All these specimens have fully agreed with the original description given by Düben and Koren, and consequently are constantly different from that of Parnell's *L. albus*. Having provided myself during the first autumn with what I thought sufficient materials, consisting of several thousand specimens, I gave, in the Forh. Vid. Selsk. Christiania, 1872, a short description of the species, comparing it with the descriptions at hand of *L. albus*, in which I endeavoured as much as possible to keep the two species separate. During the succeeding years I tried amongst the great quantities of *L. stuwitzii* to find *L. albus*, but without

¹ The name *Latrunculus* was employed by Dr. Gray as early as in 1847, for a Gasteropod (Proc. Zool. Soc. Lond. 1847, p. 139). But, as I was informed by my friend the late Dr. Mörch, of Copenhagen, this name is quite superfluous, and will hardly ever be reemployed for that mollusk.

success. In the winter months the fjord is covered with ice; and in the spring and summer I had no opportunity of tracing them. In August 1874 I certainly found a couple of breeding females, together with some others which had already spawned; but none of these differed in any point from the typical *L. stuwitzii*; and in September again the young of the year solely were seen. Therefore I could add nothing of importance to my previous researches published in the 'Norges Fiske' in 1874.

It was almost accidentally that, in June 1875, I found one of the spawning-places; and during a couple of excursions I succeeded in collecting a considerable number of fully developed specimens of both sexes. It then became quite evident that *L. stuwitzii* was based on the female and the immature males of the same species, the mature males of which were *L. albus*. On several occasions examples of typical *L. albus*, which all, without exception, proved to be old males, were taken from the same shoal as *L. stuwitzii*, all of which were females ready for spawning. Another lot consisted of somewhat younger specimens in various stages of transformation between both forms, all full-grown, but with the eggs and milt not yet perfectly ripe.

Von Düben and Koren described their species from four specimens taken in winter (in the month of December), and consequently out of their spawning-season; but Parnell, on the contrary, had for the description of his *Gobius albus* 50 specimens caught in June in Solway Frith, thus just during their breeding-time. From Parnell's description we may conclude that he had only mature males at his disposal; nor does Dr. Günther, in compiling his catalogue (1861), seem to have had at his disposal any females,—as may be seen from the fact that both these authors speak only of individuals with long teeth. By the kindness of Dr. Günther I have received three specimens of the Scottish form, collected by Parnell himself; and one of these, curiously enough, proves to be a female with the minute teeth and the sloping fins, in other words, a typical *L. stuwitzii*. Thus Parnell had overlooked female individuals, perhaps few in number, and had drawn his description solely from the males.

Having endeavoured to identify the two species of Western Europe, it remains to discuss the third and fourth species of this genus, the *L. pellucidus* of Southern Europe.

In 1824, according to Dr. Günther, a description was given by Nardo of a Mediterranean form under the name of *Gobius pellucidus*. I have not had an opportunity of seeing the periodical in which Nardo gave his original description (Giorn. Fis. Chim. di Stor. Nat. d. Pavia); but from the title of the paper ("Osservazioni ed aggiunte all' Adriatica Ittiologia") it seems that his specimens were taken in the Adriatic. The species since Nardo's time has often been mentioned by those naturalists who have treated upon the fauna of the Mediterranean, and, as it appears, under somewhat different names. In Hist. Nat. Eur. Mérid. tom. iii. p. 287 (1826), Risso mentions a species under the name *Aphia meridionalis*, n. gen. et sp.,

which perhaps may be the same as Risso's, although it can hardly be proved with any certainty, as the description is, in the first place, too incomplete, and, secondly, disagrees in several respects with our species. It is therefore scarcely advisable to adopt the generic name given by Risso; but if this naturalist really had in view *L. pellucidus* (which is very probable), his description, besides being incorrect¹, is also incomplete, from no notice having been taken of the mature male. Another generic name, which is ascribed to Nardo, is *Brachiochirus* (cf. Bonap. Cat. Method. Pesci Europ. p. 64, Napoli, 1846, and Atti Ist. Veneto, tom. v. ser. 3, p. 796, Venezia, 1859-60); but I have had no opportunity of examining the work wherein that genus is established². Canestrini mentions the species, in his memoirs on the Gobioid Fishes found in the Gulf of Genoa (Arch. Zool. Anat. Fisiol. fasc. ii. vol. i. p. 152), under the name of *Gobius albus*, Parn. This author shows the difference in the structure of the teeth between the sexes in the Mediterranean form, without, however, bringing his description to bear upon the young male.

Last year I received from Prof. G. O. Sars a couple of specimens of the Adriatic form, collected by him during a stay in Trieste in the spring of 1876. As it seems to abound there, and is well known to all fishermen, it is very possible that it is Nardo's *G. pellucidus*; and it has therefore been of much interest to me to be able to make a comparison between this and the northern form, with which it agrees in development (*L. stuwitzii*). This comparison has been thoroughly conclusive of the fact that they are identical. The specimens from Trieste were collected in the month of March, and had then not yet reached their fully mature state. Their total length varies between 42 and 44 millims.; otherwise the length of the head, the size of the eyes, the general structure of the body, the number of rays and of the transverse muscular striæ—further, the teeth—in short, every thing, down to the most minute spots of the coloration, completely agrees with specimens of the same size and state of development from Christiania.

Finally, Kessler, in Bull. Soc. Imp. Nat. Mosc. tom. xxxii. (1859), gives a tolerably detailed description of a form from the Black Sea (Odessa), which he calls *Gobius pellucidus*, n. sp., being apparently ignorant of Nardo's previous description of a species of the same name.

With regard to this form, it does not seem to differ at all from *L. albus* (or the male in spawning-season). The distinction between them, which Dr. Günther thinks may be made, that Kessler's species has a larger diameter of the eye, namely $\frac{1}{4}$ of the length of

¹ This is especially the case with regard to the description of the fins and their rays; the number of the rays in the first dorsal is also omitted, which is a point of great importance.

² If in Risso's *Aphyia* and Nardo's *Brachiochirus* we can recognize *Latrunculus pellucidus*, both these names will have priority over *Latrunculus*, Günther. The decision of this, as well as other similar questions of priority, I leave to those who have greater opportunities of examining the literature of Southern Europe than can be obtained here in the library of the University of Christiania.

the head, and equal to the snout, whilst, on the contrary, the eye of *L. albus* is contained 5 times in the length of the head, and is shorter than the length of the snout, is of little consequence, as in fact both the original specimens of Parnell and those from the Christiania Fjord have rather the proportions of length given by Kessler. Although this author expressly remarks that he knows the mature females, he must have overlooked (as well as Parnell) the differences between these and the males, and in his description (for instance, of the structure of the teeth) only have taken notice of the latter.

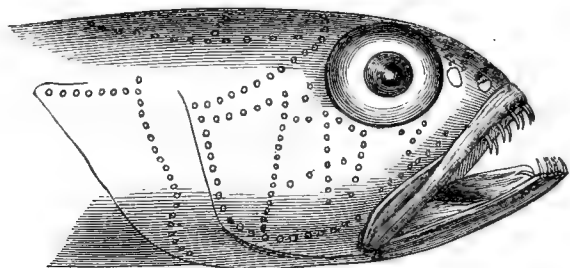
B. General Description.

Before entering into a more detailed description of the species in general, I will briefly point out some of the principal peculiarities which separate the individuals in the different periods of life. From this it will be seen that the difference in the sexes of the species in the fully developed state is considerably greater than with any of our northern species of the typical genus *Gobius*.

Out of the spawning-season the males and the females (which at this time only exist in the shape of young specimens) are exactly alike in appearance, although they soon reach the size of the old ones. The body is slender, the head pointed; the jaws, in consequence, are less oblique, and seem, therefore, to be shorter. The teeth are all uniform, minute, and form a close single row. The caudal fin is slightly emarginated, the second dorsal and the anal diminishing behind. In this stage they are all typical *L. stuwitzii*.

The nearly mature males, the milt of which is not yet quite ripe, have the head considerably more thickened, and longer jaws; besides the minute teeth, there is become visible an outer row of cylindrical teeth, yet not full-grown, but having reached a greater length than the others. The posterior rays of the second dorsal and the anal fins are still lower than the anterior; the caudal is slightly emarginated, or square.

Fig. 2.



Head of *Latrunculus pellucidus*, mature male, magnified.

The mature males have an average total length (the caudal included) of 42–43 millims. (a few have the milt ripe, with a total length of 40 millims.), but reach a size of 50–51 millims. The body is plump; the head thick and tumid; the interorbital space broad; the cleft of the mouth wide, with fully developed teeth of only one

kind, few in number, but long and cylindrical. The posterior rays of the anal and second dorsal fins are, as a rule, not shorter than the anterior, making the fins about even in their whole length. The caudal fin is slightly square, with rounded edges in the young individuals, but truncated in the elder ones.

The nearly mature females, not yet quite ready for spawning, agree in general with the individuals in the immature state, from which they differ in the somewhat swollen belly.

The females ready for spawning have an average length of about 42 millims.; many having the spawn ripe are of a length of 38 millims.; none reach a length of more than 46 millims. (the caudal included). The head is not visibly thickened, but is about the same as during the whole young period; it is rather more pointed than in the male; the cleft of the mouth is considerably smaller, although the jaws may possibly have become a trifle longer than before. The teeth, however, have not undergone any change, but are uniform, exceedingly fine, and placed in the same row as in the young individuals. The caudal fin is emarginated, and the anal and the second dorsal are tapering behind, as is the case in their younger state.

The construction of the body is slender and elongated, laterally compressed; and it is only during the spawning-season that the body of the male becomes thicker and more plump.

A specimen of medium size out of the spawning-season has a total length of 40 millims., of which the head is 9 millims.; and this is contained about 4·4 in the total length (the caudal fin included). The greatest height is 5·5 millims., or contained 7·2 in the total. The vent is situated about 2 orbital diameters nearer the snout than the root of the caudal.

In the spawning-season the body becomes fully developed, although the total length does not increase. In a male with a total length of 40 millims. the length of the head is 9·5 millims. (4·2 in the total); in the female about the same as before.

The eyes have a diameter of 2 millims., and occupy $\frac{2}{9}$ of the length of the head. The orbital space, which, as a rule, is narrow, and does not reach the breadth of an orbital diameter, has in the mature male fully the last-named breadth.

The number of the gill-rays is 5; the gill-openings are wide, and stretch forwards to about the middle of the orbit.

The mouth is oblique, and the lower jaw longer than the upper, the maxillary extending to below the middle of the orbit. During the spawning-season the jaws of the male become considerably larger and more oblique; at the same time, the head and all parts of the body become swollen, the jaws extending much deeper under the eye.

The number of the vertebræ is 27; the processus spinosi are very long, and reach almost to the dorsal and ventral line. The medulla spinalis extends as far back as to the middle of the 22nd vertebra.

The teeth.—Before the spawning-season the structure of the teeth is exactly alike in both sexes. In each of the jaws is found on both sides a single series of 20–25 minute and very closely fitted

teeth, which project very little beyond the jaws. Only the innermost part of the lower jaw is entirely toothless. These teeth make their appearance very early in the young. In a young specimen of scarcely 14 millims. length, some very minute (microscopical) teeth are already visible in the front part of the lower jaw, although they cannot with certainty be seen in the upper. In specimens of the total length of 23 millims. there are some small teeth visible in both jaws; and on being dried, one may see that some of them are already developed; still they continue to be minute until the specimens have reached their full length.

The teeth of the female undergo no special alteration the whole of their life through, but continue during the spawning-season in the same state as before; but in the males, on the other hand, these minute teeth of young specimens begin to disappear towards the spawning-season, and are replaced by a set of long and cylindrical ones. These long teeth do not proceed from the minute teeth, but constitute an entirely new set, which shoot forth at the same time as the original set disappears. In the specimens wherein the organs of generation are still not fully mature, both sets of teeth are visible for a short period at the same time, the new set only half developed.

Finally, during the spawning-season all the minute teeth of the male have almost entirely disappeared, and are replaced by the new, long, and almost straight teeth, situated at a remarkable distance from each other, and chiefly to be found on the front part of the jaws. In the lower jaw their number is 4, or sometimes but 3, on each side; they are not particularly pointed, but almost cylindrical, only slightly curved, and placed almost vertically upon the outer edge of the jaw. At a little distance below and inside the last of these teeth, on each side, is found a sharp, curved tooth (canine) directed backwards and almost in the form of a claw. In the posterior half of the jaw the prolonged teeth are missing, a few of the minute teeth of the young period still remaining here.

In the upper jaw the number of the long teeth is 5 on each side, of which a few (1-2) are also to be found behind the middle of the jaw. In the upper jaw there is also found, inside the ordinary row on each side, the curved canine, which is directed backwards; this canine is placed further in front than the opposite one in the lower, or nearly at the point of the jaw. There may further be found in the posterior part more or less remaining of the original minute teeth, whilst these only exceptionally are found at the point of the jaw.

The fins.—The first dorsal fin has 5 rays, and is a little higher in the full-grown males than in the females, without, however, reaching the height of the body. All the rays are about evenly high, undivided, feeble, and rather closely set. This is one of those fins which appear latest, and is entirely wanting in specimens of a total length under 16 millims., wherein all the remaining fins have already got their rays. In individuals of the total length of about 22 millims. this fin is found with extremely feeble and short spines, which are often difficult to detect.

The distance between the two dorsals is at least so great that the rays of the first can never reach to the commencement of the second.

The second dorsal fin has 13, rarely only 12 rays, the last of which is a double one, although not divided in many young individuals. In the full-grown female, as well as in immature individuals of both sexes, it strongly decreases posteriorly: the first is only half as long as the second and third, which are the longest; after this the length diminishes successively, and the last (the double one) has scarcely the length of the first. The first ray is not articulated; the remaining are all articulated; the first and the second are single, the remaining divided at the point (the double ray only in its innermost branch). In the mature male the posterior rays are lengthened, the fin becoming almost even; the point of the posterior rays reaches a distance of the diameter of the eye from the root of the caudal fin, this distance being considerably larger in the females and young individuals. The caudal fin has 17 articulated rays, besides a row of 10 short, feeble, unarticulated, supplementary rays on each side. All the articulated rays (with the exception of the two outermost on each side) are twice divided in the outer two thirds of the fin. The length of the fin does not exceed considerably the height of the body. Its form in young specimens, as well as in the female is always slightly emarginated, which is also the case with a great number of the males during the spawning-season; other males have the caudal fin square, with rounded corners; and it is only in the case of the older that the middle rays are longer than the other ones, by which means the form of the fin becomes rounded.

The anal fin has 14 rays, the last of which is a double ray. In its construction and position it agrees in general with the second dorsal; and having a ray more, it stretches a little further back than this.

The pectoral fin has 16 articulated rays, all of which, with the exception of the outermost on each side, are divided in the outer third of the fin, and after the fourth ray doubly divided. The form is somewhat pointed; the point is scarcely the distance of one diameter of the eye from the vent. In accordance with the rule in the generality of fishes, this fin is one of the latest developed; in a specimen with a total length of 19 millims., it consists only of a rounded flap, in which there is a vestige of a few rays.

The ventral fins have their origin beneath the root of the pectorals, and consist each of 6 rays. These together form the more or less developed funnel, which is typical of the subfamily *Gobiinae*. When expanded, the opening of the funnel forms an oblong ring, which runs parallel with the ventral line. All the rays are three times divided down to the root, and are very movable. In the full-grown male the extreme point reaches almost as far back as the pectorals. In the female and the immature males the ventrals are very much shorter, the funnels and the outer division of the rays indistinct; the extreme point is distant more than half the length of the head from the vent.

*The mucous glands*¹, the true nature of which has perhaps not yet positively been proved, are to be found on all parts of the head in longer or shorter rows, which vary comparatively little in the different specimens. To give a more detailed description of them would require too much space; but a drawing (see fig. 2, p. 323) has been taken from a comparison of several specimens. Two parallel series across the hinder part of the interorbital space are easy to be observed, as may also two others, running along the upper side of the snout, and sending forth some shorter series down to the nostrils. The rest of these glands reach as far back as to the first dorsal fin; and shorter rows are found immediately behind the ventrals.

The scales and the skin.—The whole body, with the exception of the head and fins, as well as the neck, throat, and belly, down to the vent, is covered with large and very easily deciduous scales. These are fastened to transverse muscular impressions, which bend together in the lateral line of the body, where the vertebræ are connected. The scales are arranged along the sides of the body thus:—First a series of 25 scales are fixed along the lateral line; above and below this row run two other rows; so that together there are 5 rows between the dorsal and ventral line. The scales are perfectly transparent, membranous and cycloid; in the lateral line they are a trifle smaller than in the other rows; they are comparatively large, having a diameter of nearly 1 millim., and are few in number. According to the above statement the total number of scales would be hardly more than 100 on each side of the body. The period in which the scales are developed I have not been able to observe to a certainty, as the scales in young specimens seem to be still more easily deciduous than in the older. In the smallest specimen I have found, with a total length of 13 millims., the transverse impressions, to which the scales are fastened, are already visible; but I have not detected the scales themselves before the specimens have attained about half their size.

The colour.—When alive the whole body is almost perfectly transparent, having only a few minute stellulate pricks in the skin. One may without difficulty count the vertebræ from the outside, and clearly distinguish the brain with its different parts, as well as the pulsation and the blood-corpuscles. The most coloured part of the body is the eye, and the innermost part of the black bladder. When preserved in spirits, or in a frozen state, they soon become white and opaque, whilst if preserved in glycerine they remain half transparent; then the minute pricks become fainter, whilst the iris always retains its silvery colour.

In the breeding-season the minute pricks become more numerous, especially in the males. A row of these pricks, yellowish red in colour, stretches along the sides, corresponding in number to the vertebræ. Along the dorsal line another row of brown pricks is found. Along the anal fin, on each side of the root of the rays, is a row of black pricks, which continues behind the end of the fin in

¹ "Stripes of minute warts," Günther, Catal. vol. iii. 1861; "External papillæ of taste," Winther, Naturh. Tidsskr. 3. R., 9. B., p. 181. Kbhvn. 1874.

the shape of a short black stripe ; this is the most conspicuous and durable of all the rows, and is never wanting. The caudal fin has a brownish shade ; sometimes this is also the case with the anal fin, whilst all the other fins are hyaline. The iris is silver-coloured, with black pupil ; the upper margin of the eye is golden, which, after death, changes to a black. The younger individuals are more sparingly pricked ; the row along the anal fin is the first which shows itself, and is already visible in the young ones, with a total length of 13 millims., where all the other pricks are wanting.

In the males in full breeding almost every part of the body has a faint brownish light, although this is nowhere collected into larger dots, but is most distinct along the transverse impressions of the muscles.

C. *Habits and Distribution.*

Generation.—It is probable that no specimen lives more than one year, and after the close of the breeding-time dies without living through another spawning ; consequently these fishes are really *annual vertebrates*.

The spawning-season occurs in the Christiania Fjord in the summer months. The latest date at which I have found females with ripe spawn was on August 2, 1872, although the greater number of them had then already spawned. The normal period of spawning is the end of June or the beginning of July. On the 10th and 14th of August, 1875, I found them in the middle of their breeding, although several were still not quite mature. When the spawning is finished all the specimens disappear entirely, and become apparently extinct.

The first young ones I took on August 28, 1875, when their average size was 22 millims. ; a few specimens were rather larger (attaining about 30 millims.), or less (down to 13 millims.). At the same time there is not a single specimen of a greater size to be found at those places where they, in the middle of June, were found in numbers and only in a full-grown state.

A month later the median length may be estimated at 34 millims., in the end of October at 38 millims. The development proceeds tolerably even with them all ; and specimens are very rarely to be found which differ to any degree from the medium size. Most of the individuals attain their full size as early as December or January, in order that, when the organs of generation begin to develop themselves in the following spring, they may acquire greater plumpness and strength in all parts of the body—a change which, as we have indicated above, chiefly takes place in the males. Amongst the thousands of specimens which I have examined during the autumn and winter, I have not found a single specimen with the slightest trace of the long teeth that characterize the mature male ; and during the summer time all the males, without exception obtain these teeth.

In the young females, at the age of only four months, the ovaries may be seen through the transparent body in the form of two elongated strings, filled with clear eggs ; in the spawning-season these

strings take up the greater part of the belly, without, however, as is the case in *Crystallogobius nilssonii*, reaching behind the vent along the root of the caudal fin. The number of the eggs is between 1800 and 2000.

Habits.—This species, as well as the following differs in its habits in several respects from most of the typical *Gobiidæ*. Above the compressed body the laterally placed eyes indicate that they do not live at the bottom, as is the case with the greater number of Gobies, but swim about freely. Neither do they keep themselves dispersed or in single numbers, but in large and dense shoals, where their perfect transparency, in connexion with their inferior size, enables them to avoid immediate observation. Sometimes I have taken them from the stomachs of other fishes; but by far the greatest number are brought up to the surface by the nets set out for different other fishes, especially for the sprat and the young of the common herring. These fishes are caught in the Christiania Fjord in September and so long as the fjord is free from ice—as a rule, until the beginning of the new year. In the spring and summer, when the nets are drawn for mackerel, they are also to be found, and then with the organs of generation fully developed. These nets are drawn at a depth varying from one to fifteen fathoms. An examination of the stomachs of these fishes shows that they contain chiefly pelagic copepods and the fry of mollusks in their swimming-stages; these animals principally live in the upper strata of the sea some few fathoms under the surface. The bottom consists, in most of the inner parts of the Christiania Fjord, of clay and mud, which, in the more shallow water, is covered with *Zostera*.

These fishes seem always to keep together in enormously large shoals; and when the meshes are very fine they are sometimes caught in great masses. The 30th of October 1875 (which was a particularly successful year for their development), I found in a single draught (which, besides, also brought in some young specimens of two or three species of *Gadus*, several *Pleuronectes flesus*, and *Otenolabrus rupestris*, some *Gobii* of common species, and herrings) such large masses of them that I collected between two and three thousand specimens, whilst possibly more than double this number had already escaped through the meshes. In the same year I was not able to notice any diminution of their numbers, and they were always found in the same places; still they are not at all equally numerous every year, and they have been rather scarce both in 1876 and 1877, especially in the latter.

In the Mediterranean they must be produced in still greater numbers, as they are caught in very fine nets and sold as food. In several of the fishing-markets in the towns by the Adriatic and in Sicily Prof. G. O. Sars saw vessels filled to the brim with these fishes alone, forming a complete jelly-like mass. Kessler also mentions their use as food in Odessa.

Upon the least touch the scales fall off; and after the nets are drawn, scarcely a single specimen will have its scales complete, and the greater number will have lost almost every scale. The proportionally

large swimming-bladder, which occupies a considerable part of the belly, expands still further when the individuals are brought up to the surface, the somewhat fatigued fish not being able to compress it so as to make the specific weight of the body to decrease sufficiently to permit it again to descend under the water. The weight of the body is also diminished by the loss of the scales; consequently a great number of such individuals are driven about on the surface of the water in a still living state, till they are carried away by the stream or picked up by sea-birds and other enemies. They swim, however, not without a certain degree of rapidity.

Their enemies are almost all other fishes who occupy the same locality. Especially the different kinds of *Gadus* devour large masses; and even in the case of small specimens of *Gadus morrhua*, *G. esmarkii*, and *G. merlangus*, I have occasionally found the stomach crammed with them. When they float about in their helpless state on the surface of the water, *Gasterosteus aculeatus* and *Spinachia vulgaris* snatch large pieces out of their brittle bodies.

As mentioned above, their food consists chiefly of microscopic copepoda and other small pelagic animals. In the specimens that I have examined in the Christiania Fjord, these principally consisted of the copepods *Dias longiremis*, Lilljeb., *Temora velox*, Baird, together with the larvæ of decapods (*Hippolyte* and *Palæmon*), and mollusks in their swimming-stage (*Cardium*). The stomach contains this kind of food both in the summer and the winter.

Distribution.—Taking for granted, that the forms from Southern, Western, and Northern Europe are identical, *L. pellucidus* has a very wide distribution, although our information touching this species is at present very incomplete. In this case it is met with (possibly in certain spots only) from the western coast of Norway, about 60° N. long., down along Western Europe to the Mediterranean, in the Adriatic, and right up to the innermost parts of the Black Sea.

In Norway it is met with outside of Bergen, and in the Christiania Fjord. At the first-named place the late naturalist Mr. Stuwitz obtained four specimens in December 1834; it has, however, not since been found in this locality. In the Christiania Fjord I have found it in several places inside Doobak, chiefly amongst the islands outside Christiania; most likely it is to be found in the outer parts of the fjord also, and undoubtedly at other places along our southern coast, not mentioned here.

In Sweden it has been found by Dr. Malm in Bohuslen.

In Scotland Mr. Parnell has taken it in Solway Frith, June 1836; and in his 'Catalogue' Dr. Günther states that the British Museum also has specimens from the Frith of Forth.

In the Mediterranean it is known, through Prof. Canestrini, from the Gulf of Genoa; and Prof. G. O. Sars found it in the beginning of 1876 at most of the places visited by him—*e. g.* in Sicily, at Messina, and Syracuse—everywhere in enormous masses. In the Adriatic, whence it was already described in 1824 by Nardo, and afterwards mentioned by several authors, he found it at Trieste.

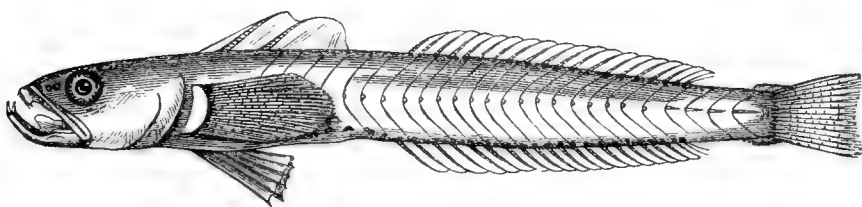
In the Black Sea it was taken in the harbour of Odessa by Kessler in 1859.

Genus *CRYSTALLOGOBIUS*, Gill.

Crystallogobius, Gill, Proc. Acad. Nat. Sci. Philad. 1863, p. 269 (1863).

Body transparent, elongate, strongly compressed, naked, with parallel muscular impressions. The male only dentiferous, the teeth in a single series; strong canine teeth in the lower jaw. Two separate dorsal fins, the first composed of two spines; ventral fins united, gill openings wide; pseudobranchiæ present.

Fig. 3.



Mature male of *Crystallogobius nilssonii*, in the breeding-season $\frac{1}{2}$.

C. NILSSONI (Düb. & Kor.).

1844. *Gobius nilssonii*, Düb. & Kor. Kgl. Vet. Akad. Handl. 1844, p. 53, tab. 2. fig. 3 (Stockh. 1846).

1861. *Gobiosoma nilssonii*, Günth. Cat. Acanth. Fish. Brit. Mus. vol. iii. p. 86 (Lond. 1861).

1863. *Crystallogobius nilssonii*, Gill, Proc. Acad. Nat. Sci. Philad. 1863, p. 269 (Philad. 1864).

1872. *Latrunculus nilssonii*, Coll. Forh. Vid. Selsk. Christ. 1872, p. 10 (Christiania, 1873).

1874. *Latrunculodes nilssonii*, Coll. Forh. Vid. Selsk. Christ. 1874, p. 151 (1875).

The intermaxillary bones in the male very prominent, short; small teeth in front of both jaws, long canine teeth in the lower jaw. The ventral fins united into a funnel, with the shorter rays towards the body. The first dorsal and the ventral fins in the female rudimentary; the ovaries project far behind the vent. Number of muscular impressions 27. The lower jaw the longer.

D¹ 2, D² 19 (20); C. 8 (9 or 10) + 15 (14) + 8 (9 or 10); A. 21; V. 6; P. 30 (31). Lin. lat. 27. Vertebr. 29. M. B. 5.

A. Remarks on the Synonymy.

This species was described by von Düben and Koren in the Vet. Akad. Handl. for 1844, under the name of *Gobius nilssonii*, the description having been taken from half a dozen specimens found off the Bergen coast in 1834-43, although it had earlier, during the same

year, been mentioned, but without any accurate description, and under the temporary name of *Gobius linearis*, by the same author in a letter which was published in *Öfv. Kgl. Vet. Akad. Förh.* May 1844. In Günther's 'Catalogue,' vol. iii. (1861) it is placed under the genus *Gobiosoma*, although the correctness of this is doubted. As early as in 1863 Prof. Gill (*Proc. Acad. Nat. Sci. Philad.*) established for this species a new generic name, *Crystallogobius*. Synonymous herewith is the name *Latrunculodes*, by which, in 1874, not knowing the remarks of Prof. Gill, I entered it in a treatise on the Gobioid Fishes of Norway (*Forh. Vid. Selsk. Christ.* 1874), and later in the same year in a paper on the Fishes of Norway (Supplementary part of the *Forh. Vid. Selsk. Christ.*).

Since the species was entered in the system in 1874, it has not been the subject of detailed description. Nilsson, in his 'Skandinavisk Fauna' (1855), has taken his description from that of Düben and Koren, as is also the case with the few other authors who mention the species.

The same applies to this species as to *Latrunculus pellucidus*, that the characters mentioned in the descriptions only belong to one of the sexes, in *Crystallogobius nilssonii* to the fully developed male. The female of this species, which shows a constant and remarkable difference from the male, has not hitherto been described.

In June 1875 I found the species in the Christiania Fjord in mature state, together with *Latrunculus pellucidus*, though in very much smaller numbers; and more lately I have on a few occasions collected young specimens out of the spawning-season. Although the number of specimens which at present stand at my disposal, namely 33, do not represent an unbroken series of all the different ages of both sexes, I can still give a descriptive account of their principal stages.

B. General Description.

The mature males have a total length of between 43 and 47 millims.; still maturity is evidently attained in some specimens with a length of 38–40 millims. The first dorsal fin has long rays with a wide membrane; the head is thickened, with a short snout; the jaws long, and singularly bent towards each other; the canine teeth in the lower jaw high and curved; and the intermaxillary bones form on each side a strong projection, almost in the form of a nail. A little more pointed is the head, and the body on the whole is more slender, in the males which have not reached a total length of 70 millims; neither have the jaws nor the teeth in this case attained their full length, though the testicles are filled with ripe milt.

The young males, whose testicles do not yet contain ripe milt, although their total length is only a trifle less than the smallest of the mature specimens, namely 36 millims., have the body thin and slender, the head pointed, almost as in the females; the teeth, however, are already visible, and all the fins normally developed.

The mature females, with the eggs ready for spawning, are considerably smaller, and of a more slender construction, than the

males. Although the total length is almost the same as in many of the mature males (36–37 millims., in a single specimen 39 millims.), their body is so slender and their weight so inconsiderable, that two full-grown females, with the ovaries filled with ripe eggs, were not able to weigh down one large full-grown male. The head is pointed, with short jaws, which are straight and perfectly toothless, and are wanting the males' prominent projection on the intermaxillary bone. The first dorsal and the ventral fins are rudimentary (at a superficial glance they appear to be entirely wanting); the pectoral fins are certainly developed, but very short. The ovaries project far behind the vent on each side of the anal fin.

The young females, with a total length of 30–33 millims., and with the ovaries filled with unripe eggs, have the body very slender and pointed: as in the old female the jaws are toothless, the first dorsal and the ventral fins apparently wanting.

The young during growth.—The few young with a total length of about 25 millims. that have been at my disposal have all been males. This is shown by the first traces of teeth, by the want of the long ovaries, as well as by the presence of all the fins; certainly the first dorsal and the ventrals are short, but never wanting or even rudimentary. These fins may already be seen in the young with a total length of 21 millims., the smallest specimen I have found; in this one, however, there was not yet any trace of the pectorals.

It may therefore be supposed that in the males the first dorsal and the ventral fins spring forth at a very early age, whilst the females never have these fins developed; the pectorals, on the other hand, are present in both sexes (although in the female in a less-developed state), but are always late in appearance.

As compared with *Latr. pellucidus*, the difference in the exterior between the sexes in the present species appears in several ways already at a very early period, whilst this difference in *Latr. pellucidus*, as stated above, only becomes apparent in mature specimens.

The construction of the body is thin and elongated, very compressed, and does not, as is the case in *Latr. pellucidus*, practically increase in plumpness in the spawning-season.

In a full-grown specimen, ready for spawning, with a total length of 46 millims. (caudal included), the length of the head is about 10 millims. and is contained $4\frac{1}{2}$ times in the total length. The greatest height ($5\frac{1}{2}$ millims.) continues almost unaltered from the occiput to about a head's length from the caudal fin, and is contained $8\frac{1}{2}$ times in the total. The vent, on the posterior margin of which there is a small papilla, is situated halfway between the snout and the root of the caudal, and in some individuals projects in the form of a short tube.

In the female, which, as stated above, is considerably smaller than the male, the head is somewhat more pointed. In a specimen with the eggs ripe the head is contained about 5 times or a little more in the total length.

The diameter of the eye is one fourth of the length of the head.

The eyes are situated perfectly laterally, so that the lower margins do not seem to project more than the upper. The interorbital space is, in the female and young specimens, not broader than the diameter of the eye, in the full-grown male a little larger. The branchiostegals are 7 in number; the gill-openings are wide.

The mouth is oblique, with the lower jaw the longer. In the female and the young males the lower jaw is almost straight, or only faintly bent, and the intermaxillary bones are quite even in their outer margin; but in the full-grown male the jaws receive a special development during the spawning-season. The intermaxillary bones then become broad, and form on each side of their margin a distinct projection, almost in the form of a nail; at the same time that the teeth reach their full development the lower jaw becomes long and strongly curved upwards, and when the mouth is shut it reaches a little in front of the intermaxillary bones, the projecting nail of which encloses the almost angularly curved upper part of the lower jaw. The point of the latter jaw is square, and, as is the case with the intermaxillary bones, in the male dentiferous. In these old males the gape reaches backwards to the posterior margin of the eye, whilst in the female and the young males it scarcely reaches beyond the middle of the eye. The length of the lower jaw in proportion to the total length is in the old males as $1:7\frac{2}{3}$, in the female as $1:10\frac{1}{4}$.

The number of *vertebræ* is 29.

The teeth.—Whilst during its immature state *Latr. pellucidus* has a construction of the teeth common to both sexes, which continues permanent in the female, whilst the male towards the spawning-season in a comparatively short time changes these teeth for another set of a totally different construction, this is not the case with *Crystallogobius nilssonii*. First, the female is perfectly toothless all her life; secondly, the teeth of the male, which are composed of both small and acute teeth and long canine teeth, are developed very early, and all reach their full size during the spawning-season.

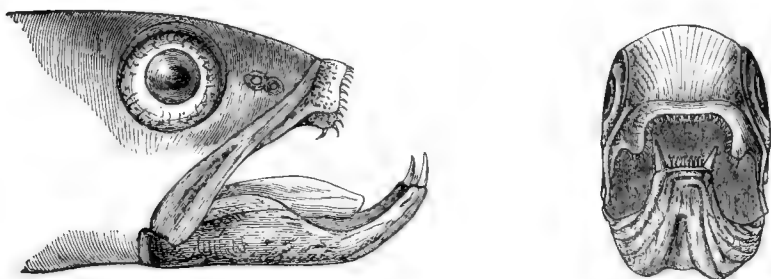
The exact time when the teeth make their appearance in the young is probably when they are about two months old. A young one, with a total length of 21 millims., and perhaps about one month and a half old, had no traces of teeth.

In the young males, which have reached a total length of 26–28 millims., the teeth begin to show themselves in the intermaxillary bones and the point of the lower jaw; at this period all the teeth are about equal in size.

In the male during the spawning-season, when the teeth have reached their full size, the projecting intermaxillary bones have on their upper and prominent portion a single row of closely placed, small, acute, and curved teeth, 13–14 in number, on each side (see fig. 4); on the lower square margin one or two teeth directed straight downwards or backwards are found. The maxillary bones are without teeth, as well as the vomer. In old males the outer part of the lower jaw runs out in a long upward curve, which at

its point is dentigerous, while otherwise the jaw has no teeth; the innermost part of this jaw forms a sharp edge, which, as the jaws meet one another, places itself inside the corresponding part of the upper jaw, whilst the point of the lower jaw, as mentioned above, is encompassed by the outward-bent intermaxillary bones. The point of the lower jaw is square and broad, and has a remarkable similarity to the jaw of a carnivorous animal. On each side of the square point is found a long and curved canine tooth, and between them a row of, together, eight small and acute teeth of the same construction as those in the intermaxillary bones.

Fig. 4.



Snout of mature male of *Crystallogobius nillsoni* in the breeding-season, strongly magnified.

The female must be pronounced toothless, as such teeth as can be found are partly irregular and partly perfectly microscopical. In a fresh or soft specimen it is scarcely possible to find even a trace of teeth; but in a dried specimen a couple of very minute and straight isolated teeth may be seen, with the aid of the microscope, on the middle of the lower jaw; these, however, are sometimes entirely wanting on one side. In a full-grown female the length of these teeth is about $\frac{1}{20}$ to $\frac{1}{15}$ of a millim.

The fins.—The first dorsal fin, which has two rays, becomes only fully developed in the mature or the nearly full-grown male, but is much shorter in the young (not half-grown) male, and rudimentary in the female. In the males it has strong but not stiff rays, which are placed at comparatively large intervals, and considerably sloped backwards, and have the point almost bent downwards, the membrane, which begins already a little in front of the first, continuing behind the last, and running along the dorsal line towards the beginning of the second dorsal fin; in some specimens it even connects both fins completely. The first ray is a little shorter than the second, the length of which does not much exceed the greatest height of the body. In the young males the rays are shorter, and the membrane between them incomplete. In the female they are shortened to such an extent that they can only be discovered by very minute examination; sometimes only one ray seems to be developed. In the female the length of the rays seems never to exceed the length of the eye, and is generally shorter, sometimes having only the length of the crystalline lens.

The second dorsal has nineteen, sometimes twenty rays, the last of which is a double ray. By means of a strong membrane the rays are directed strongly backwards, and appear, therefore, lower than they really are; they are all even, and have a length equal to half the height of the body. The posterior rays are not elongated even in the male, and reach to an orbital diameter's distance from the root of the caudal fin. All the rays are indistinctly articulated, and undivided; and it is only by the aid of the microscope that in some individuals a trace may be seen of an indistinct division at the point. Still shorter and more delicate are the rays of the female, their length being scarcely equal to an orbital diameter.

The caudal fin has fifteen articulated middle rays, sometimes only fourteen; also on each side eight, sometimes nine or ten short connecting rays, which are widely divergent in their points, especially the foremost, so that they can even point forwards, giving the root of the fin an increased breadth. The middle rays are articulated, and all of them divided from about the middle (except the two outermost on each side); but neither of the branches is further divided. The first ray is short and thin, and the articulation is not very plain; the fourth and fifth rays are the longest, while the middle rays again become shorter. One consequence of this is, that the fin becomes more or less emarginate, with rounded edges; it is rather short, and scarcely attains the greatest height of the body.

The anal fin counts twenty-one rays, the hinder of which is a double ray. It takes up nearly the whole space between the vent and the caudal, and agrees very much in its form and construction with the second dorsal. It is only by very favourable light that any trace of articulation in the points of the rays can be discovered, and not in all of them. The last ray reaches almost to the root of the caudal; in some undamaged individuals it is even connected with the last-named fin by a membrane, whilst this membrane is wanting in others.

The pectoral fin counts thirty, sometimes thirty-one rays. Twelve to fourteen of the middle rays are singly divided from about the middle; the remainder are undivided. All are finely articulated. The form of the fin is broadly rounded. The pectoral fins are not very long; in mature males they have about two thirds of the head's length, and do not reach to the vent. In young males and in the female they are much shorter, although they are never rudimentary.

The ventral fins, which are attached close to the root of the pectoral fins, and just behind the lower end of the gill-openings, are well developed in the mature male, shorter in the younger male, and rudimentary in the female.

When present they form a closed and deep funnel, which is square-cut behind, and, contrary to what is found in the other *Gobiidæ*, have their innermost rays (nearest to the belly) shorter than the outer ones. The number of the rays is six in each fin: of these the first is divided from about the middle; the remainder are more slender, undivided, and not articulated. On the whole, the faint

tendency to division of the rays is characteristic of this species as compared with *Latrunculus pellucidus*, in which division of the rays takes place especially in the ventral fins. The funnel is comparatively short; when closed it is, even in the male, removed from the vent to a distance about equal to its own length. In young males the ventral fins are very small, and their funnel-like shape is almost imperceptible, the connecting membrane being incomplete.

In the female the ventral fins are completely rudimentary, being only present as a couple of two disconnected and very short rays scarcely the diameter of the eye in length.

The *mucous glands*, which in *L. pellucidus* form so extensive a system, seem to be almost entirely wanting in *Crystallogobius nilssonii*; in none of the specimens which I have examined have I been able, with certainty, to find a single complete row of such glands, either on the head or on any other part of the body.

The skin.—No trace of scales has hitherto been detected in any of the specimens examined. As is the case in *L. pellucidus*, the whole side of the body shows a row of transverse impressions; when examined in the microscope, no trace is found of follicles to which lost scales may have been attached; and it is therefore scarcely to be doubted that the body is altogether naked in this species. The number of these muscular impressions is twenty-seven, twenty of which have their place behind the vent; they bend together into the form of an angle in the middle line of the body, and denote exactly the number and size of the vertebræ. An actual lateral line, with open pores, does not exist.

The colour.—As is the case in *L. pellucidus*, the body during life is transparent, with a faint bluish tinge, thereby enabling the vertebræ, the apple of the eye, &c. easily to be seen. The coloration of the skin is very faint, and does not vary in this respect to any degree, even during the spawning-season. The eyes are strongly coloured, their upper edge being of a shining metallic lustre (black after death); the iris is silvery. A well-defined blackish spot is found at the point of the lower jaw; another black stripe stretches along the throat towards the ventral fins. At the root of each ray in the anal and the caudal fin there is a black point; these together form a continuous and distinct row, which is present in both sexes and at all ages; along the dorsal fin there is found a somewhat fainter row of brownish points, which is indistinct, or nearly wanting, in the female. Moreover all the rays are covered with minute blackish points. The body itself is almost unspotted (whitish when preserved in spirits), except on the sides of the belly, where a row of fine brownish spots stretches itself; these spots are largest and most distinct in the breeding female, their number being 3-5 on each side.

C. *Habits and Distribution.*

Generation.—With regard to the time of breeding and its duration, nothing conclusive can be said at present on account of the very

few materials at my disposal. In all probability *Cryst. nilssonii* reaches (as is the case with *Latr. pellucidus*) maturity at the age of one year, after which it disappears. The spawning-season is probably the same as in the other species, consequently during the summer months; on the whole, however, it appears to have a somewhat longer duration.

From the researches I have been able to make among collected specimens, compared with those preserved in the Museum of the University, it appears that the spawning probably begins in some individuals as early as in March or April; perhaps the greater number attain their maturity in the last part of June; whilst in other specimens the spawning does not take place before the beginning of August, or perhaps later. After the conclusion of the spawning the specimens no doubt perish, their life having thus lasted only one year.

Habits.—In its habits this fish probably agrees perfectly with *Latr. pellucidus*. The extraordinarily compressed body denotes that it swims freely about in rather deep water, and not, like most of the true *Gobii*, resting itself at the bottom; in fact this would be almost impossible, on account of the peculiar construction of the ventrals of the male, and, in the case of the female, from its entire want of these fins. Most of the specimens mentioned by other authors have been taken in the dredge at a depth of 30 fathoms. Von Düben and Koren state that some of their specimens crept into empty tubes of *Chætopterus norvegicus*, in which, however, they had only taken refuge whilst the dredging was going on.

In the Christiania Fjord I have taken these fishes, together with *Latr. pellucidus* in nets set out for mackerel, *Clupea sprattus*, and young of *Cl. harengus*. The nets bring them to the surface in the same manner as is the case with *L. pellucidus*. As a rule they lose the capability of again descending, from the swimming-bladder becoming strongly distended when they reach the upper strata of the water. This fish is met with in far less numbers than the last-named species. In the same manner it is taken as food by other fishes; and I have taken it from the stomach of small young examples of *Gadus morrhua*.

Food.—Upon examining a number of stomachs of individuals taken in the month of June, I have found them filled with digested remains of Entomostraca, without, however, being able to recognize any species of them. Probably they were Calanidæ, or, perhaps, pelagic Copepoda of the same species as are found in *Latr. pellucidus*.

Distribution.—Besides being found in Norway, *Cr. nilssonii* has been taken more lately on the coast of Bohuslän (Sweden); and perhaps it also occurs on other parts of the coast of Northern Europe. In Norway its habitat extends from the Christiania Fjord along the western coast, nearly to the Trondhjems Fjord, in about 63° N. latitude.

The most northern point at which it has been found was at Christiansund, in July 1843, by v. Düben, and also about the same

time at Askwold, in Sond-fjord, by Mr. Christie—in all only six specimens.

In the neighbourhood of Bergen five specimens were taken by Mr. Stuwitz, December 1834; in 1850 one specimen was found at Bongestrømmen, near the town: in all six specimens.

One specimen was dredged by Prof. G. O. Sars at Espevar, in the mouth of the Hardanger Fjord in August 1873.

In the mouth of the Christiania Fjord two specimens were dredged in two different localities about 1860; finally, in the years 1875-77 I took twenty-eight specimens in nets between the islands off Christiania.

In Sweden two specimens were found (in a dead state) in Bohuslen by Dr. Malm, in June 1877.

March 19, 1878.

Arthur Grote, Esq., V.P., in the Chair.

Mr. Sclater exhibited the type specimen of *Dicrurus marginatus* of Blyth (Ibis, 1865, p. 46), belonging to the Derby Museum, Liverpool, and pointed out its identity with *Muscipipra vetula* (Licht.) of Southern Brazil, of the family Tyrannidæ.

The following papers were read:—

1. Contributions to the Ornithology of the Philippines.—No. VI. On the Collection made by Mr. A. H. Everett in the Island of Leyte. By ARTHUR, Marquis of TWEED-DALE, F.R.S., President of the Society.

[Received February 25, 1878.]

The island of Leyte is about 130 miles long, and has an average breadth of 35 miles. It lies S.S.W. of Samar, its northern part lying in close contiguity to Samar. Zebu is situated to the west, and Dinagat to the south-east, while Mindanao is due south. Water-channels of unimportant breadth separate Leyte from these other islands. A peculiar ornis is therefore not to be expected, and Mr. Everett's researches have not made known any special feature. That gentleman, however, procured all the birds of which I propose to give a list at Amparo (on the south-west coast of Leyte) and in its vicinity. But Mr. Everett writes that he does not believe the collection he sends at all adequately represents the avifauna of Leyte, and he hopes to revisit it and explore the mountains in the centre and south of the island.

The most interesting species is *Buceros semigaleatus*, a purely local form, distinguishable from the two previously known Philippine

species by the contour of the casque. *Thriponax pectoralis* is another species, the deviation of which from *T. javensis* of Luzon is probably owing to isolation. In *Arachnothera flammifera* Mr. Everett has added another Malayan genus to the Philippine area.

1. *CACATUA HÆMATUROPYGIA* (1).

[Amparo, ♂ ♀, July.]

2. *TANYGNATHUS LUZONENSIS* (3).

[S. Leyte, ♂, September.]

3. *LORICULUS HARTLAUBI* (7)?

[Amparo, ♂ ♀, July.]

I provisionally identify a series of nine examples of the South-Leyte *Loriculus* with *L. hartlaubi* until further research establishes the permanency of the characters whereby these Leyte birds differ from those of North Mindanao and Dinagat. Five individuals are examples of the male bird in apparently adult plumage. They differ from true *L. hartlaubi* in having a much smaller orange-red pectoral plastron, and in its not running up to the naked chin, but stopping short some way below, so that the upper throat is uniform green. Above, the back is green, and not golden, nor is that of the female. The dimensions are equal.

4. *ASTUR TRIVIRGATUS* (11).

[Amparo, ♀, July.]

In Mr. J. H. Gurney's opinion this Leyte example is in immature plumage, and probably belongs to a male.

5. *SPILORNIS HOLOSPILUS* (16).

[S. Leyte, ♂ ♀, September.]

6. *HALIASTUR INTERMEDIUS* (17).

[S. Leyte, ♂ ♀, September.]

7. *THRIPONAX PECTORALIS*, n. sp.

[S. Leyte, ♂ ♀, September.]

Like *T. javensis*, but differs in having the feathers of the chin, throat, sides of head and neck white, broadly centred with a median black stripe, and in the fulvous-white colouring of the abdomen covering the breast, each pectoral plume being centred with black.

8. *MEROPS PHILIPPINUS* (35).

[S. Leyte, ♂ ♀, September.]

9. *MEROPS BICOLOR* (36).

[S. Leyte, ♂ ♀, September.]

Two examples in mature plumage, two immature; the chestnut head and back in the latter mixed with green, and the middle pair of rectrices not fully developed.

10. EURYSTOMUS ORIENTALIS (37).

[Amparo, ♂ ♀, August.]

11. ALCEDO BENGALENSIS (38).

[S. Leyte, ♂ ♀, October.]

12. CEYX ARGENTATA.

Ceyx argentata, Tweeddale, Ann. & Mag. N. H. ser. 4, vol. xx. p. 533.

[S. Leyte, ♂, October.]

13. ENTOMOBIA GULARIS (44).

[Amparo, ♂, August; S. Leyte, September.]

14. SAUROPATIS CHLORIS (47).

[Amparo, ♂ ♀, August.]

15. PELARGOPSIS GIGANTEA.

Pelargopsis gigantea, Walden, P. Z. S. 1877, p. 541.

[Amparo, ♂ ♀, July; S. Leyte, ♂ ♀, September and October.]

Ten examples, all of which belong to the smaller North-Mindanao and Dinagat race, which I have hitherto provisionally referred to *P. gigantea*.

16. CENTROCOCCYX VIRIDIS (64).

[S. Leyte, ♂ ♀, October: iris brown. ♂, September: iris yellowish brown; bill black; legs steel-grey.]

17. BUCEROS SEMIGALEATUS.

Buceros semigaleatus, Tweeddale, P. Z. S. 1878, p. 277.

18. PENELOPIDES AFFINIS.

Penelopides affinis, Tweeddale, Ann. & Mag. N. H. ser. 4, vol. xx. p. 534; P. Z. S. 1877, pp. 824, 825 (fig. 1)¹.[Amparo, ♂ ♀, July; S. Leyte, ♂ ♀, September and October, ♀ juv.²: iris raw sienna-brown; bill greenish brown; mandible greenish; legs dark greenish grey. ♀. Iris in living bird rich dark burnt-sienna-orange.]

The new rectrices in both sexes of this species are pure white, and not pale rufous, the apices always remaining black. In one example (♀) the two middle rectrices have a dark rufous terminal band, black being indicated where this band meets the paler rufous of the basal portion. In a young male this also occurs.

19. LANIUS NASUTUS (70).

[S. Leyte, ♂ ♀, September and October.]

¹ The passage in which I differentiate *P. affinis* from *P. panini* and *P. manille* (l. c.) should read "by the absence of the channelling on the lateral plates of the maxilla."² Marked ♂ by collector, but in complete black plumage.

20. *LANIUS LUCIONENSIS* (72).

[S. Leyte, ♂ ♀, September.]

The males are in adult dress, with pearl-grey foreheads. The female has all the gular and pectoral plumage narrowly edged with brown, as well as the feathers of the flanks and thighs. The entire upper plumage is uniform liver-brown, without a trace of grey on the forehead.

21. *ARTAMUS LEUCORYNUS* (73).

[Amparo, ♂, August; S. Leyte, ♀, October.]

22. *LALAGE DOMINICA* (76).

[Amparo, ♂, July.]

23. *CYORNIS PHILIPPINENSIS*.*Cyornis philippinensis*, Sharpe, Tr. L. S. 2nd series, Zool. i. p. 325.

[Amparo, ♂, July.]

24. *HIRUNDO JAVANICA*.*Hirundo javanica*, Sparman, Mus. Carls.

[S. Leyte, ♂, September, ♂ juv., October.]

25. *BRODERIPUS ACORRHYNCHUS* (90).

[Amparo, ♀, July; S. Leyte, ♂ ♀, September.]

26. *MIXORNIS CAPITALIS*.*Mixornis capitalis*, Tweeddale, P. Z. S. 1878, p. 110, pl. vii. fig. 2.

[S. Leyte, ♀, October: iris white.]

27. *IXUS GOIAVIER* (99).

[Amparo, ♀, July; S. Leyte, ♂ ♀, September.]

28. *HYPSIPETES PHILIPPINENSIS* (102).

[S. Leyte, ♂, September.]

29. *MONTICOLA SOLITARIUS* (103).

[S. Leyte, ♂ ♀, October.]

Three examples are in dull plumage, the feathers, especially on lower surface, broadly margined with brown; above, a bluish tinge. These are marked female by the collector. A fourth example (marked ♀) is passing over from this stage, the blue tinge above being much more marked, while most of the abdominal plumage and the under tail-coverts are rich chestnut. A fifth example (marked ♂) is in nearly full blue and dark rich chestnut plumage.

30. *COPSYCHUS MINDANENSIS* (106).

[S. Leyte, ♂ ♀, September.]

31. *PHYLLOSCOPUS BOREALIS*.*Phyllopus borealis*, Blasius, Naumannia, 1858, p. 313.

[S. Leyte, ♂, October.]

32. *CALOBATES MELANOPE* (115).

[S. Leyte, ♀, September.]

33. *MYZANTHE PYGMÆA* (121).

[S. Leyte, ♂, October: iris chocolate.]

34. *ARACHNOTHERA FLAMMIFERA*, n. sp.

[S. Leyte, ♂, September: iris salmon-red; bill black; legs dark lead-grey.]

Above uniform rich olive-green; chin, throat, sides of head, and neck pale grey; upper breast pale grey, tinged with yellow; lower breast a purer pale yellow; abdomen, flanks, ventral region, and under tail-coverts deep yellow; wing-lining silky pale grey, almost white; pectoral tufts (which measure some three quarters of an inch long) bright vermilion-red; quills brown, margined with olive; rectrices brown, all but the middle pair boldly tipped on the inner webs with white.

Wing 2.45, tail 1.75, culmen 1.25, tarsus 0.62.

The discovery of this species by Mr. Everett adds another characteristic Malayan genus to the Philippine avifauna.

35. *NECTAROPHILA SPERATA* (122).

[S. Leyte, ♂, September.]

36. *ARACHNECHTHRA JUGULARIS* (123).

[Amparo, ♂ ♀, July, August.]

37. *CORVUS PHILIPPINUS* (125).

[S. Leyte, ♂ ♀, July.]

38. *CALORNIS PANAYENSIS* (128).

[Amparo, ♂, August; S. Leyte, ♂ ♀, September and October, ♂, juv., September: iris brownish ochre-yellow.]

The young bird is in brown and striated plumage.

39. *SARCOPS CALVUS* (129).

[Amparo, ♂ ♀, July.]

These two examples have the whole back, from the nape to the uropygium, and also the scapulars dark brown. This is also the case in my Zebu series, and in some individuals from South Negros. In one Negros example the back is dark brown, many of the feathers being fringed with various shades of grey. In another the amount of grey and brown on the back is about equal; and it would seem that the grey colouring of the back belongs to the fully adult bird, and that the nape, uropygium, and upper tail-coverts assume the full grey colouring of the adult before the dorsal plumage commences to turn grey; the whole of the upper plumage is brown at the base, the tips alone changing to grey.

40. *MUNIA JAGORI* (132).

[Amparo, ♀, July; S. Leyte, ♂, September.]

41. PHABOTRERON BREVIROSTRIS.

Phabotreron brevirostris, Tweeddale, P. Z. S. 1877, p. 549.

[Amparo, ♀, July.]

42. CARPOPHAGA ÆNEA (141).

[Amparo, ♂ ♀, July.]

43. TURTUR DUSSUMIERI (147).

[Amparo, ♂ ♀.]

44. CHARADRIUS FULVUS (159).

[S. Leyte, ♂ ♀, September and October.]

In non-breeding plumage.

45. EUDROMIAS GEOFFROYI (161).

[S. Leyte, ♂ ♀, September and October.]

46. EUDROMIAS MONGOLICUS (163).

[S. Leyte, ♀, September.]

47. ÆGIALITES DUBIUS (162).

[S. Leyte, ♀ ♂, September and October.]

All the examples, nine in number, are of birds in full breeding-plumage.

48. ÆGIALITES PERONII.

Charadrius peronii (Temm.); Schlegel, Mus. Pays-Bas, *Coraces*, p. 33; Walden, Tr. Z. S. viii. p. 90. no. 142, pl. x, f. 2.

[S. Leyte, ♀, October.]

In immature plumage; first primary only two thirds grown; sides of breast and narrow connecting band brown, mixed with rufous; broad frontal patch pure white, bounded posteriorly by a narrow brown band; crown and occiput rufous brown; tarsus one inch.

49. MELANOPELARGUS EPISCOPUS.

[Amparo, ♂, July.]

In full plumage.

50. GALLINULA CHLOROPUS (169).

[Amparo, ♂ ♀, July.]

51. ORTYGOMETRA CINEREA (172).

[Amparo, ♂ ♀, July; S. Leyte, ♂, September.]

52. PORZANA FUSCA (174).

[S. Leyte, ♂, September: iris brilliant red; orbital ring crimson; bill olive-green, culmen black; legs light dull carmine.]

A single example, which belongs to the small race, *i. e.* true *P. fusca*, and not to *P. erythrothorax*.

53. *RALLINA EURYZONOIDES*.

Gallinula euryzonoides, Lafr. Rev. Zool. 1845, p. 368.

[Amparo, ♂ ♀, July and August ; S. Leyte, ♂ ♀, September.]

54. *AMAURORNIS OLIVACEA* (176).

[S. Leyte, ♂ ♀, July.]

55. *HYPOTÆNIDIA TORQUATA* (177).

[Amparo, ♂, July ; S. Leyte, ♀, July.]

The female example differs from every other individual of this Philippine Rail I have examined in having the broad pectoral band coloured like the back.

56. *HYPOTÆNIDIA STRIATA* (179).

[Amparo, ♂ ♀, July ; S. Leyte, ♂ ♀, September. ♂ juv., September, bill purple brown, the culmen dark brown.]

57. *TOTANUS INCANUS*.

Scolopax incana, Gm. S. N. i. p. 658.

[S. Leyte, ♀, October : iris dark brown ; bill dark brown, nearly black ; legs light greenish ochre.]

58. *TRINGOIDES HYPOLEUCUS* (183).

[S. Leyte, ♀, September.]

59. *GALLINAGO SCOLOPACINA* (187).

[S. Leyte, ♂ ♀, September.]

60. *GALLINAGO MEGALA* (188).

[S. Leyte, ♀, September.]

61. *RHYNCHÆA CAPENSIS* (189).

[S. Leyte, ♂, September.]

62. *ARDETTA CINNAMOMEA* (192).

[Amparo, ♂, July ; S. Leyte, ♂ ♀, September.]

63. *HERODIAS GARZETTA* (195).

[S. Leyte, ♀, September : iris light yellow ; orbital skin yellowish, clouded with dark grey ; bill black, base of mandible whitish ; legs black ; feet greyish green ; upper surface of toes tinged with purplish.]

64. *BUTORIDES JAVANICA* (197).

[Amparo, ♂, July ; S. Leyte, September.]

One example in full, another in immature plumage.

65. *NYCTICORAX MANILLENSIS* (198).

[Amparo, ♀, July ; S. Leyte, ♂, September : iris golden-yellow ; orbital skin yellow-green ; bill black ; legs pale ochreous white but brown in front and on upper surface of toes.]

The male is in full breeding-plumage. The lengthened occipital

plumes are black throughout their length, and not only at their tips, as described by Vigors and figured by Fraser.

66. *STERNA BERGII*.

Sterna bergii, Licht. Verz. d. Doubl. Mus. Berl. p. 80.

[S. Leyte, ♂, October.]

67. *DENDROCYGNA VAGANS* (203).

[Amparo, ♂ ♀, July; S. Leyte, ♂, September.]

2. Reports on the Collections of Birds made during the Voyage of H.M.S. 'Challenger.'—No. VIII. On the Birds of the Sandwich Islands. By P. L. SCLATER, M.A., Ph.D., F.R.S.

[Received February 26, 1878.]

The 'Challenger' arrived in Hilo Bay, Owhyhee, on the 14th of August, 1875, and left on the 19th of the same month.

The skins of birds collected were 24 in number, belonging to 13 species. They were all obtained "within eight miles of the town."

The collection, although small, and containing nothing absolutely new except a single species of *Anas*, is of interest, as it enables us to record the actual island of the Sandwich group upon which the species contained in it were found, and as including an example of the little-known *Buteo solitarius* of Peale.

The best account of the avifauna of the Sandwich-Island group, which is still very imperfectly known to us, is that given by Dole in 1869¹. On this I have commented at some length in 'The Ibis' for 1871², and given my views on the subject pretty fully. Lately M. Oustalet has described a most remarkable new form³ from the same group; but I am not aware of any other more recent contributions to this subject⁴.

1. *CHASIEMPIS SANDVICENSIS*.

Sandwich Flycatcher, Lath. Syn. ii. p. 343, undè

Muscicapa sandvicensis, Gm. S. N. i. p. 945.

Chasiempis sandvicensis, Cab. Wieg. Arch. 1847, i. p. 208.

Cnipolegus, sp. 1238, Scl. Cat. A. B. p. 203; vide P. Z. S. 1873, p. 555.

No. 528. Hilo, Owhyhee. ♀. }

529. „ „ „ }

"Flycatcher: eyes black; stomachs contained insects."—J. M.

¹ "Synopsis of the Birds hitherto described from the Hawaiian Islands. By S. B. Dole," Proc. Boston Soc. N. H. xii. p. 294.

² "Remarks on the Avifauna of the Sandwich Islands. By P. L. Sclater," Ibis, 1871, p. 356.

³ *Loxioides bailloni*: vide Bull. Soc. Phil. de Paris, 7^{me} sér. t. i. p. 99.

⁴ Dr. Pucheran's somewhat peculiar views on the avifauna of the Sandwich Islands will be found explained in the Procès-Verbaux Soc. Phil. de Paris, 1858, p. 85.

2. PHÆORNIS OBSCURA.

Dusky Flycatcher, Lath. Syn. vol. ii. pt. i. p. 344, undè

Muscicapa obscura, Gm. S. N. i. p. 945.

Tanioptera obscura, Cassin, B. U.S. Expl. Exp. Atlas, pl. ix. fig. 3.

Phæornis obscura, Sel. Ibis, 1859, p. 327, et 1871, p. 360.

No. 534. Hilo, Owhyhee. ♂. }

535. " " ♀. }

536. " " " }

537. " " " }

"Eyes brown; bill and feet black."—J. M.

3. MOHOA NOBILIS.

Gracula nobilis, Merrem, Av. Descr. et Ic. p. 8, pl. ii.

Mohoa nobilis, Cass. Pr. Ac. Sc. Phil. vii. p. 440.

Yellow-tufted Bee-eater, Lath. Syn. i. p. 683, undè

Merops niger, Gm. S. N. i. p. 465.

No. 524. Male. Hilo.

"Eyes black; stomach contained fruit and insects."—J. M.

4. PSITTIROSTRA PSITTACEA.

Parrot-billed Grosbeak, Lath. Syn. ii. p. 108. pl. 42, undè

Loxia psittacea, Gm. S. N. i. p. 844.

Psittirostra psittacea, Sw. Class. B. ii. p. 295.

538. Male. Hilo.

545. Male. Hilo.

"Eyes red; stomach contained fruit."—J. M.

As I have already stated (Ibis, 1871, p. 360), this bird has, in my opinion, no relationship to the Fringillidæ, but is merely an exaggerated form of the same type as *Hemignathus* and its allied genera.

5. DREPANIS COCCINEA (Merrem).

Mellisuga coccinea, Merrem, Av. Descr. et Ic. p. 14, pl. iv. (1786).

Drepanis coccinea, Cassin, Zool. U.S. Expl. Exp. p. 177.

521. Female adult. }

522. Young female. } Hilo.

523. " " }

"Eyes red; bill and legs orange; stomach contained insects and seeds."—J. M.

6. DREPANIS SANGUINEA (Gm.).

Certhia sanguinea, Gm. S. N. i. p. 479.

Drepanis sanguinea, Bp. Consp. i. p. 404.

530. Female. Hilo.

7. *DREPANIS FLAVA*, Bloxham.

Drepanis flava, Bloxh. Voy. Blonde, p. 249 ; Dole, Proc. Boston Soc. N. H. xii. p. 298.

525. Male.	} Hilo, Owhyhee.
526. Male.	
527. Female.	
533. Female.	

"Eyes black ; stomachs had seeds and insects."—*J. M.*

The females are much less yellowish than the males, especially below.

8. *MUNIA NISORIA* (Temm.) ; Walden, Trans. Zool. Soc. viii. p. 73.

543. Male. "Sparrow, introduced ; native who shot it said he had never seen one before."—*J. M.*

An imperfect skin of this species (or of the nearly allied *M. punctularia*), no doubt introduced.

Prof. Baird a short time ago sent me a skin of a young or female of another Eastern Finch from the Sandwich Islands (probably *Munia malabarica*) for determination ; also without doubt introduced.

9. *OTUS BRACHYOTUS* (Forster).

Strix sandwichensis, Bloxam, Voy. Blonde, p. 250.

Asio galapagoensis, Cassin, Mamm. et Orn. U.S. Expl. Exp. p. 207.

Asio accipitrinus, Sharpe, Cat. B. ii. p. 234.

544. "Male ; eyes yellow ; brought on board alive."—*J. M.*

10. *BUTEO SOLITARIUS*.

Buteo solitarius, Peale, Zool. U.S. Expl. Exp. Birds, p. 62 (1848).

Pandion solitarius, Cassin, Mamm. & Orn. U.S. Expl. Exp. p. 97, Atlas, pl. iv.

Polioaëtus solitarius, Sharpe, Cat. B. i. p. 452.

No. 540. Female.

"Eyes brown ; cere and legs yellow ; bill black."—*J. M.*

Mr. J. H. Gurney has kindly examined this interesting bird for me (of which two specimens were obtained, but one of them was subsequently lost), and supplied me with the following notes :—

"The female Buzzard brought from Owhyhee by the 'Challenger' Expedition (No. 540 in that collection) appears to be of the same species, though in a different stage of plumage, as the previously unique specimen from the same island, which is preserved in the Museum of the Academy of Natural Sciences at Philadelphia, and which was described by Peale, in the first edition of the 'Zoology of the United-States Exploring Expedition,' published in 1848, under the name of *Buteo solitarius*."

"In the subsequent edition of this work, published in 1858, and edited by the late Mr. Cassin, the generic name of *Buteo*, as applied to this species, was dropped, and that of *Pandion* substituted, with the following remark :—'This bird is strictly a member of a subgenus

of the generic group *Pandion* designated *Polioaëtus* by Dr. Kaup.' (*Vide op. cit.* p. 98.)

"Mr. Ridgway, on the contrary, after an examination of the type specimen, wrote to me that he considered it 'a Buteonine form differing from the true *Buteones* only in the system of coloration, which reminds us somewhat of *Milvago chimachima*.'

"In the specimen brought home in the 'Challenger' there is much less resemblance to the coloration of *M. chimachima*, and nothing, in my opinion, to justify the removal of this species from the genus *Buteo*.

"The following is a comparison of the measurements of the Challenger example with those of the type specimen as given by Mr. Cassin in the work to which I have referred:—

	Type specimen (sex unknown). inches.	'Challenger' specimen (female). inches.
Total length of skin	17 (above)	17·7
Wing	12	12
Tail	7·5	7·2
Bill from gape	1·5	1·5
Tarsus	2·75	2·8
Hind toe and claw	1·75	2·2
Middle toe s. u.	1·7
Claw of ditto	0·8
Culmen (exclusive of cere)	1·1
Cere	0·4

"Mr. Cassin describes the type specimen as having 'the third, fourth, and fifth quills longest and nearly equal,' which agrees with the 'Challenger' specimen, as does his description under the head of 'form' generally; but I think that, in speaking of the toes as having 'their under surfaces strongly corrugated or pustulated, claws very large, long, and curved,' he uses rather stronger language than is strictly applicable to the 'Challenger' specimen, though in this the under surface of the feet is certainly somewhat corrugated and roughened, and the claws are slightly longer than in *Buteo vulgaris* or in *Buteo desertorum*.

"As regards the difference of coloration in the two specimens, Mr. Cassin describes the type as having the 'head and entire underparts and upper tail-coverts yellowish white, all the feathers being pure white at their bases and widely terminated with pale yellowish, more distinct on the breast and tibiæ.'

"In the 'Challenger' bird the upper part of the head is dark wood-brown like the mantle, except that some of the feathers, especially on the crown and forehead, are partially edged with yellowish white; on the sides of the head these white edgings are more conspicuous; the throat is white; the breast, abdomen, under tail-coverts, flanks, and wing-linings are white, slightly tinged with buff, especially on the tibiæ, and more or less mingled with wood-brown throughout, except on the lower abdomen and tibiæ, the brown pre-

dominating over the buffy-white on the flanks, and almost entirely covering the sides of the breast.

"Mr. Cassin further describes the type specimen as having the 'occiput and neck behind with oblong longitudinal spots of umber-brown, which is the colour also of all the upper surface of the body, wings, and tail; shafts of quills reddish chestnut on their upper surface, white beneath; inner webs of quills widely edged with white; tail beneath silky-white tinged with yellowish.'

"The 'Challenger' specimen agrees with this portion of Mr. Cassin's description, with the following exceptions, viz.:—the occiput and hinder part of the neck are white-coloured and of the same hue as the mantle; the upper surface of the shafts of the quills is brown, but without any 'reddish-chestnut' tint; the upper surface of the tail is brown, with transverse bars of a darker brown; on the middle pair of rectrices these are eleven in number, the lowest bar being subterminal; on all the rectrices the edge of the outer web and the tip are of a darker brown than the remainder of the feather, but beyond the dark tip there is at the extreme end of the feather a small central spot of white, which is more conspicuous on a new rectrix only partially grown than in the older feathers, from some of which it has been worn off by use; the inner webs of the lateral rectrices are also more or less mottled with white towards the edge. The dark transverse bars are indistinctly apparent on the under surface of the tail.

"The figure of the type specimen (U.S. Exploring Expedition, pl. iv.) agrees with the description given by Mr. Cassin, and also shows a larger bare space behind the eye than exists in the 'Challenger' specimen; but, notwithstanding this difference and those of coloration to which I have alluded, I think that the coincidence of size and form marks the two specimens as belonging to the same species, and that the example obtained by the 'Challenger' Expedition must be considered as a specimen of *Buteo solitarius* of Peale."

11. *ANAS WYVILLIANA*, sp. nov.

"*Anas boschas*," Dole, Pr. Boston S. N. H. xii. p. 305; Finsch et Hartl. Orn. C. P. p. xxxix. (?)

541. Male. } Eyes brown; legs and feet orange.

542. Male. }

Supra nigra, plumis fusco limbatis; pileo nigro, fusco minute punctato; subtus pallide fusca, in gutture et pectore magis rufescens, in ventre magis ochracea, plumis nigro punctatis et maculatis; alis extus brunnescenti-cinereis; speculo amplo purpureo, marginibus supra et infra albo inde nigro ornato; axillaribus albis; rostro superiore nigro, inferiore carneo; pedibus aurantiacis. Long. tota 15.0, alæ 9.3, caudæ 3.0, rostri a rictu 2.0, ejusd. lat. sub naribus 0.7, tarsi 1.5.

Hab. Inss. Sandwich, maris Pacifici.

This Duck belongs to the section of true *Anas* which embraces *A. obscura* of North America, *A. superciliosa* of Australia, and other species, and in which both sexes somewhat resemble the female of *Anas boschas*. The head is dark, finely pointed with brown, and

bears no trace of a superciliary stripe; the speculum is shining purple with a black border above and below; beyond the black border below the coverts terminate in a broad margin of pure white; above the upper black border, which is formed by the ends of the small coverts, there is a narrow ashy-white margin.

The description is taken from specimen 541; the other (542) is apparently a young bird and is rather smaller in its dimensions.

12. *FULICA ALAI*, Peale.

Fulica alai, Peale, Zool. U.S. Expl. Exp. Birds, p. 224; Cassin, Mamm. & Orn. U.S. Expl. p. 306, Atlas, pl. xxxvi.

531. Male. "Eyes red; bill flesh-coloured with a yellowish tinge; feet and legs pale slate-colour."—*J. M.*

13. *TOTANUS INCANUS* (Gm.).

532. Female. Eyes hazel; bill brown; legs yellow.

3. On a Small Collection of Birds from the Samoan Islands and the Island of Rotumah, Central Pacific. By W. A. FORBES, F.Z.S.

[Received March 1, 1878.]

Mr. Sclater has lately put into my hands for determination a small collection of birds from the above localities, made by the Rev. G. Brown, C.M.Z.S., of the Wesleyan Mission. It consists of 47 skins referable to 19 species. Of these all but 4 skins, of two species, are from the Samoan Islands of Upolu and Savaii, and are well known already as inhabitants of these islands. They require no further notice here, except one.

PACHYCEPHALA ICTEROIDES, Peale; Finsch & Hartl. Faun. Centr.-Polyn. p. 76.

Three examples of this species, in different stages of plumage, though none are quite adult, traces of the rufous plumage of immaturity remaining to a greater or less extent. All are marked "from Upolu;" and the native name given is "Vasavasa." Mr. Layard (P. Z. S. 1876, p. 494) doubts the occurrence of this species in Samoa, and refers the bird from those islands to *P. flavifrons* (Peale), which, as Dr. Finsch has shown (J. f. O. 1872, p. 39), is the adult male of *P. icteroides*.

The island of Rotumah is, as far as I am aware, entirely unknown ornithologically; and the three skins in this collection from that locality are, I believe, the first that have ever been received from the island. It is a small island, 4 or 5 miles in extent from north to south, and was discovered by Captain Edwards in his search for the 'Bounty' in 1791. It lies nearly midway between the Fijis and the Ellice group, in about long. 177° E., lat. 12½° S. Some account of it will

be found in the 'South-Pacific Directory,' 3rd edition, p. 627 (London, 1871). The two species of birds of this island represented are,—

APLONIS VITIENSIS, Layard, P. Z. S. 1876, p. 502.

Aplonis tavuensis, F. & H. Faun. Centr.-Polyn. p. 103, t. x. f. 2 (nec Gmelin).

One skin of this species, agreeing with skins from Fiji in the British Museum, and others from the same islands in the 'Challenger' collections, determined by Dr. Finsch as "*Aplonis vitiensis*, Lay." (conf. Finsch, P. Z. S. 1877, p. 735). The native name is given as "Husila."

MYZOMELA CHERMESINA, G. R. Gray, G. B. i. pl. 38; id. Cat. B. Trop. Islands, p. 11.

This species was figured by Mitchell in the 'Genera of Birds,' but not described; nor was any locality mentioned for it in the list of species of *Myzomela* in the same work. Bonaparte, however, in his 'Conspectus,' gave "New Guinea" as the habitat, though what reason for this he had, other than that at that time "Nova Guinea" was a convenient "refuge for the destitute," is not known. The figure in the 'Genera' represents a bird with a uniform scarlet under surface; but fortunately the original specimen is still in existence, mounted in the Bird Gallery of the British Museum. Two specimens of a *Myzomela*, certainly distinct from any other known as inhabiting the Pacific Islands, were contained in Mr. Brown's collection from Rotumah; and a look at Gray's figure sufficed to indicate considerable differences between the two birds. On examining, however, Gray's type of his *M. chermesina*, it became evident at once that the two birds were really identical, and that the apparent difference, consisting in the belly and vent being of a uniform red in the plate, instead of a brownish-black, was due to a mistake on the artist's part. As *Myzomela chermesina* has not yet been described, and is irrecoznizable from Gray's figure, I herewith proceed to give a diagnosis and description.

MYZOMELA CHERMESINA, G. R. Gray, Gen. B. i. pl. 38; id. B. Trop. Isl. Pacif. p. 11; Bp. Consp. Av. i. p. 394. sp. 3 ("ex Nova Guinea!"); Gray, Handl. B. i. p. 154. no. 1989 ("New Guinea?").

♂ (ad.?). *Fusco-nigricans, alis caudaque nitore nonnullo metallico; mento, gula, pectore lateribusque abdominis, cum dorso uropygioque, nitide coccineis, plumis basi nigris; rostro nigro, pedibus brunneo-corneis. Long. tot. circa 4½, rostr. ⅝, al. 3, caud. 2 (poll. Angl.).*

Male. Fuscous-black; intercapulars and wing-coverts darker, and with a slight metallic gloss, which extends onto the tail; primaries browner, the internal web narrowly margined with whitish, except at tip; wings beneath pale greyish-brown; chin, throat, breast, sides of belly till near legs, back, rump, and upper tail-coverts shining crimson-scarlet, the feathers black at base; beak black; legs dark horn-colour.

A second specimen, marked female, resembles in general that described, but is rather smaller, and all the colours are duller, particularly the red of the throat and chest, so that the black-brown of the back forms a broad ring between the chin and breast. The under wing-coverts are whitish, and the pale internal margin of the primaries more conspicuous. It is probably a younger bird.

Habitat. Island of Rotumah, Central Pacific. Native name "Aramea." I ought to mention that Mr. Sharpe has lately received, in a collection from Erromango, one of the New Hebrides, a specimen of this bird almost identical with mine in every respect. This is very curious; for Erromango is far removed from Rotumah, and the neighbouring island of Tanna is inhabited by a *distinct* species (*Myzomela cardinalis* (Gm.), figured in Latham's Synopsis, vol. i. pl. xxxiii. fig. 2).

4. A List of the Birds collected by Mr. E. C. Buxton at Darra-Salam, on the coast of Africa opposite Zanzibar.
By FRANCIS NICHOLSON, F.Z.S.

[Received March 4, 1878.]

My friend Mr. Buxton, whose ornithological collection from Sumatra was described by the Marquis of Tweeddale last year ('Ibis,' 1877, p. 283), and whose name is therefore already well known to naturalists, has recently returned from a short visit to the Zanzibar coast, and has brought with him a small collection of birds. These he has lent to me for description; and I give a list of the species in the present paper, merely adding my regret that it is not a longer one. Owing, however, to a sharp attack of fever, Mr. Buxton was only able to remain on the coast a little more than a fortnight; and this accounts for the smallness of the collection. I feel sure that ornithologists will agree that, considering the collecting of birds was not the primary object of Mr. Buxton's expedition, the number of species is not a meagre one for a fortnight's shooting.

Our knowledge of East-African ornithology is not very extensive at present; and in the present paper I have referred to the only two essays which have dealt with the birds of the Zanzibar district.

These are as follows:—

1. Hartlaub, G. Report on a Collection of Birds formed in the Island of Zanzibar by Dr. John Kirk.—P. Z. S. 1867, p. 823.
2. Sharpe, R. B. On a Collection of Birds from Mombas, in Eastern Africa.—P. Z. S. 1873, p. 710.

There remains also the list of birds procured by the late Baron von der Decken, and described by Dr. Cabanis in the third volume of his 'Reisen in Ost-Afrika,' and the inestimable work of Drs. Finsch and Hartlaub, the 'Vögel Ost-Afrika's.' I have followed the order and classification adopted in the last-mentioned book.

I have only to add that the locality where this collection was made is Darra-Salam, described by Mr. Buxton as a splendid harbour, on the main coast, S.E. of Zanzibar: the country is agricultural for a mile, and then covered with bush and low timber. The birds were procured in July 1877.

Besides the birds brought by Mr. Buxton I am indebted to Dr. Günther for permission to examine a small parcel of skins sent to him by Messrs. I. and F. Moir of Zanzibar, and collected by them also at Darra-Salam. Although most of the birds had already been obtained by Mr. Buxton, there are one or two not included in that gentleman's captures.

1. *ASTUR TACHIRO*.

Astur tachiro (Daud.), Sharpe, Cat. B. i. p. 99.

Nisus tachiro, Finsch & Hartl. Vög. Ostaf. p. 78.

A young female in Messrs. Moir's collection.

2. *ASTURINULA MONOGRAMMICA*.

Asturinula monogrammica (Temm.); Finsch & Hartl. Vög. Ost-Afr. p. 59; Sharpe, P. Z. S. 1873, p. 711; id. Cat. B. i. p. 275.

Two specimens. It is quite evident from the way in which these two birds differ in the character of the bars on the under surface, that there is some variation in this respect to be accounted for, and *A. meridionalis*, Hartl. (Cf. Sharpe, Cat. i. p. 277) cannot be separated as a species.

3. *GLAUCIDIUM CAPENSE*.

Glaucidium capense (Smith); Sharpe, Cat. B. ii. p. 223.

Athene capensis, Finsch & Hartl. t. c. p. 98.

Two specimens of this rare little Owl, agreeing with Mr. Sharpe's description of the type in the British Museum. Dr. Finsch and Hartlaub considered it probable that this species would be more plentiful on the east coast of Africa than it is in South Africa; and this seems likely to prove the case.

4. *EURYSTOMUS AFER*.

Eurystomus afer (Lath.); Finsch & Hartl. t. c. p. 150; Sharpe, Ibis, 1871, p. 274; id. P. Z. S. 1873, p. 712.

Two specimens: wing 6·8 inches.

5. *CORACIAS CAUDATA*.

Coracias caudata (L.); Hartlaub, P. Z. S. 1867, p. 824; Finsch & Hartl. t. c. p. 154; Sharpe, Ibis, 1871, p. 194; id. P. Z. S. 1873, p. 712.

6. *HALCYON CHELICUTENSIS*.

Halcyon chelicutensis (Stanl.); Finsch & Hartl. t. c. p. 162; Sharpe, t. c. p. 712.

Halcyon striolata, Hartl. t. c. p. 824.

Two specimens.

7. CERYLE RUDIS.

Ceryle rudis (L.); Finsch & Hartl. *t. c.* p. 175.

Two specimens of this widely distributed species, which, however, does not seem to be so common in E. Africa as elsewhere, as this is the first record of it from Zanzibar.

8. MEROPS SUPERCILIOSUS.

Merops superciliosus, L.; Finsch & Hartl. *t. c.* p. 178.

Three specimens, all of the brown-headed type, the true *M. superciliosus*.

9. MEROPS PUSILLUS.

Merops pusillus (Müll.); Sharpe, *t. c.* p. 712.

M. minutus, V.; Finsch & Hartl. *t. c.* p. 188.

Three specimens; the eyebrow in each being very distinctly blue.

10. MEROPS ALBICOLLIS.

Merops albicollis, V.; Finsch & Hartl. *t. c.* p. 185; Sharpe, *t. c.* p. 712.

Several specimens of this very common Bee-eater.

11. DICROCERCUS HIRUNDINACEUS.

Dicrocercus hirundinaceus, Sharpe, ed. Layard, B. S. Afr. p. 101.

Merops hirundineus, Finsch & Hartl. *t. c.* p. 193.

On comparing this specimen with other African individuals, I notice that the colour of the blue on the abdomen and under tail-coverts is paler, and I can find no trace of a blue eyebrow in Mr. Buxton's specimen.

12. IRRISOR ERYTHORHYNCHUS.

Irrisor erythrorhynchus (Lath.); Hartl. *t. c.* p. 824; Finsch & Hartl. *t. c.* p. 202; Sharpe *t. c.* p. 712.

One specimen.

13. CINNYRIS MICRORHYNCHUS.

Cinnyris microrhynchus, Shelley, Monogr. Cinnyridæ, part 1.

Nectarinia jardinii, Hartl. P. Z. S. 1867, p. 824; Finsch & Hartl. *t. c.* p. 218, pl. ii. fig. 1; Sharpe, *t. c.* p. 713 (nec Verr.).

Cinnyris jardinii, Cab. in Von der Decken's Reis. iii. p. 29.

An adult male fully bearing out the distinctions put forward by Captain Shelley.

14. CINNYRIS GUTTURALIS.

Cinnyris gutturalis (L.); Shelley, Monogr. part 1; Sharpe, ed. Layard, B. S. Afr. p. 311.

N. gutturalis, Hartl. *t. c.* p. 824; Finsch & Hart. *t. c.* p. 216; Sharpe, *t. c.* p. 713.

Cinnyris gutturalis, Cab. *t. c.* p. 28.

Several specimens.

15. *ANTHODIÆTA ZAMBESIANA.*

Anthodiæta zambesiana, Shelley, Monogr. Cinnyr. part 1; Sharpe, ed. Layard, B. S. Afr. p. 321.

N. collaris, Hartl. *t. c.* p. 824; Finsch & Hartl. *t. c.* p. 223; Sharpe, *t. c.* p. 713 (nec V.).

N. corallis, Cab. *t. c.* p. 28.

An adult male individual, confirming the characters given by Captain Shelley.

16. *DRYMÆCA AFFINIS.*

Drymæca affinis, Smith; Sharpe, ed. Layard, B. S. Afr. p. 259. One example. Cf. Sharpe, *l. c.*

17. *CISTICOLA ISODACTYLA.*

Cisticola isodactyla, Peters; Sharpe, ed. Layard's B. S. Afr. p. 269.

Drymæca isodactyla, Finsch & Hartl. *t. c.* p. 236.

Three specimens.

18. *MACRONYX STRIOLATUS.*

Macronyx striolatus, Heugl. J. f. O. 1863, p. 164.

M. croceus, Finsch & Hartl. *t. c.* p. 276 (nec V.).

Two specimens. I think that Heuglin was wrong in reuniting his *M. striolatus* with *M. croceus*. It seems to me to be a distinct bird, with the sides of the neck streaked with white near the black collar, whilst *M. croceus* has no white streaks on the side of the neck.

19. *ANTHUS RAALTENI.*

Anthus raalteni, Temm.; Hartl. *t. c.* p. 825; Cab. *t. c.* p. 22; Finsch & Hartl. *t. c.* p. 274.

Three specimens agreeing with Zanzibar skins of Dr. Kirk's in the British Museum, and identified as above by Drs. Finsch & Hartlaub.

20. *CRATEROPUS KIRKI.*

Crateropus kirkii, Sharpe, Layard's B. S. Afr. ed. 2, p. 213.

One specimen of a Babbling Thrush in bad order. It appears to belong to Mr. Sharpe's new species.

21. *PYCNONOTUS NIGRICANS.*

Pycnonotus nigricans (V.); Finsch & Hartl. *t. c.* p. 297; Sharpe P. Z. S. 1873, p. 712.

Ixus nigricans, Hartl. *t. c.* p. 825.

Three specimens.

22. *ORIOLOUS LARVATUS.*

Oriolus larvatus, Licht.; Sharpe, P. Z. S. 1873, p. 714; id. Cat. B. iii. p. 217.

An adult in Messrs. Moir's collection.

23. BUCHANGA ASSIMILIS.

Buchanga assimilis (Bechst.) ; Sharpe, Cat. B. iii. p. 247.

Dicrurus divaricatus (Licht.) ; Finsch & Hartl. t. c. p. 323 ; Sharpe, t. c. p. 714.

Two specimens.

24. TELEPHONUS ERYTHROPTERUS.

Telephonus erythropterus (Shaw) ; Finsch & Hartl. t. c. p. 336 ; Sharpe, t. c. p. 714.

Two specimens.

25. DRYOSCOPIUS AFFINIS.

Dryoscopus affinis, Gray ; Hartl. t. c. p. 824.

Laniarius affinis, Finsch & Hartl. t. c. p. 349.

L. salimæ, iid. t. c. p. 349.

Dryoscopus cubla et *D. salimæ*, Sharpe, t. c. p. 714.

I forwarded these birds to my friend Mr. R. Bowdler Sharpe, who is working at the genus, and am indebted to him for the synonymy as above, and for the following note:—"I am glad to see that Dr. Hartlaub, in his new work on the Birds of Madagascar, unites *D. salimæ* to *D. affinis*. The two specimens now sent by Mr. Buxton represent these two supposed species—the male being *D. affinis*, and the female with white lores and grey rump *D. salimæ*. A large series of dated and sexed specimens must be examined before we can understand for certain the plumages of these little Bush-Shrikes. In the present pair the female has a totally black wing, and has grey bases to the scapulars, while the male has a narrow white edging to some of the wing-coverts, and very distinct white bases to the scapulars."

26. BRADYORNIS PALLIDUS.

Bradyornis pallidus (Müller) ; Sharpe, Cat. B. iii. p. 310.

B. subalaris, Sharpe, t. c. p. 713, pl. lviii. fig. 1.

Two specimens.

27. SIGMODUS GRACULINUS.

Sigmodus graculinus (Cab.) ; Sharpe, Cat. B. iii. p. 325.

Prionops graculinus, Cab. t. c. p. 24, taf. iii.

A specimen in changing plumage, but without any white bar on the lower surface of the wing.

28. PHOLIDAUGES VERREAUXI.

Pholidauges verreauxi, Bocage in Finsch & Hartl. Vög. Ostafri. p. 867 ; Sharpe, t. c. p. 714.

P. leucogaster, Finsch & Hartl. t. c. p. 376.

An adult male, with the characteristic white edging to the outer tail-feather. It was included in the 'Vögel Ost-Afrika's' as *P. leucogaster*, from its being met with in Mozambique by Commander Sperling. There can be little doubt, however, that *P. verreauxi* of South Africa

goes up the east coast, and extends at least as far as Angola on the west coast.

29. ESTRELDIA CYANOGASTRA.

Estrela cyanogastra (Daud.); Sharpe, Cat. Afr. B. p. 65. no. 616.

A single specimen in Messrs. Moir's collection.

30. HYPHANTORNIS NIGRICEPS.

Hyphantornis nigriceps, Layard; Finsch & Hartl. *t. c.* p. 392; Sharpe, *t. c.* p. 715.

One specimen of this Weaver-bird was included in the collection sent by Messrs. Moir.

31. PYTELIA MELBA.

Pytelia melba (L.); Finsch & Hartl. *t. c.* p. 441.

A female specimen, and of course difficult to determine correctly from this sex only; but it appears to agree with examples from South Africa in the British Museum. Drs. Finsch and Hartlaub, moreover, record it from South Mozambique, where Dr. Peters obtained it.

32. EUPLECTES NIGRIVENTRIS.

Euplectes nigriventris (Cass.); Sharpe, *t. c.* p. 715.

Pyromelana nigriventris, Finsch & Hartl. *t. c.* p. 415.

An adult male specimen.

33. EUPLECTES CAPENSIS.

Euplectes capensis (L.).

Pyromelana capensis, Finsch & Hartlaub, *t. c.* p. 416.

An adult male specimen.

34. PASSER DIFFUSUS.

Passer diffusus, Smith; Hartl. *t. c.* p. 826.

P. swainsoni, Finsch & Hartl. *t. c.* p. 451.

Two specimens.

35. COLIUS LEUCOTIS.

Colius leucotis, (Rüpp.); Finsch & Hartl. *t. c.* p. 472; Sharpe, *t. c.* p. 714.

One specimen.

36. TOCKUS MELANOLEUCUS.

Tockus melanoleucus (Licht.); Sharpe, ed. Layard, B. S. Afr. p. 127.

Buceros melanoleucus, Finsch & Hartl. *t. c.* p. 485.

Two specimens.

37. PŒOCEPHALUS FUSCICAPILLUS.

Pœocephalus fuscicapillus (Verr.).

Psittacus fuscicapillus, Hartl. *t. c.* p. 826.

Pionias fuscicapillus, Finsch & Hartl. *t. c.* p. 499.

Pæocephalus fuscicapillus, Sharpe, *t. c.* p. 711.

Three specimens.

38. *POGONORHYNCHUS MELANOPTERUS*.

Pogonorhynchus melanopterus (Peters); Finsch & Hartl. *t. c.* p. 504; Marsh. Monogr. Capit. pl. vii.

An adult specimen of this rare Barbet.

39. *BARBATULA PUSILLA*.

Barbatula pusilla (Dum.); Marshall, *t. c.* p. 117, pl. xlviii.

I have carefully compared Mr. Buxton's specimen with two others in the British Museum from Abyssinia (*Blanford*); and I find them quite identical in coloration, the Zanzibar bird being the least bit smaller (wing 2·05 in.). This species is new to the avifauna of Eastern Africa.

40. *COCCYSTES JACOBINUS*.

Coccytes jacobinus (Bodd.); Sharpe, P. Z. S. 1871, p. 597, et 1873, p. 711.

One specimen in moult.

41. *CENTROPUS SUPERCILIOSUS*.

Centropus superciliosus (Rüpp.); Hartl. *t. c.* p. 826.

Several specimens.

42. *TRERON DELALANDII*.

Treron delalandii (Bp.); Hartl. *t. c.* p. 827; Finsch & Hartlaub, *t. c.* p. 535.

One specimen agreeing with a South-African example of the above-named species, excepting that the size is rather smaller (wing 7·2 inches), and the bill rather long. The markings and colour of the tail appear to be identical.

43. *FRANCOLINUS GRANTI*.

Francolinus grantii, Hartl. P. Z. S. 1865, p. 665, pl. 39. fig. 1; Finsch & Hartl. *t. c.* p. 589.

Identical with typical specimens of *Francolinus rostratus*, Gray (Cat. Gallinæ Brit. Mus. 1867, p. 52), which is identified with *F. grantii* by Drs. Finsch and Hartlaub.

44. *ACTITIS HYPOLEUCUS*.

Actitis hypoleucos (L.); Hartl. *t. c.* p. 827; Finsch & Hartl. *t. c.* p. 752.

One specimen.

5. Descriptions of new Species of Central-American Butterflies of the Family Erycinidæ. By F. DuCANE GODMAN and OSBERT SALVIN.

[Received March 7, 1878.]

The species of Erycinidæ described in the present paper are some that we have been unable to find names for when examining the Central-American representatives of the family. Specimens of the greater part of them are in our collection; but some have been described from examples in that of Mr. H. Druce, whilst others have been lent to us by Dr. O. Staudinger of Dresden, and by Mr. T. Belt. We hope, before long, to publish figures of the whole of them.

1. EURYGONA HYPOPHÆA.

♂. Exp. 1·15 in. Outer margin of secondaries slightly angulated; above nearly uniform dark brown with a slight rufous tint in the centre of each wing; beneath brown; across the primaries beyond the cell a broad, indistinct, dark band; across the middle of the secondaries a similar band; a submarginal row of nearly obsolete black spots on the secondaries.

♀. Exp. 1·2 in. Outer margin of secondaries more strongly angulated in the middle than in the male; above dull brown, slightly paler on the distal half of the secondaries; three white spots on the primaries, one at the end of the cell and two beyond it, one on either side of the second median branch: beneath, much paler, nearly uniform; an indistinct, narrow, dark band passes from the costa of the primaries inside the two outermost of the white spots and across the secondaries, curving round to near the middle of the inner margin; a submarginal row of black spots with minute white ones associated with them on the secondaries.

Hab. Veragua, Chiriqui (*Ribbe*).

Mus. nostr. (♂) et Dr. O. Staudinger (♀).

2. EURYGONA LEUCORRHOA.

♂. Exp. 1·25 in. Secondaries slightly produced, margin entire; above deep red-brown; costa, apex, and outer margin pure dark brown: beneath pale earthy brown, distal third of the primaries and the apex of the secondaries darker; distal half of the secondaries silvery grey; a narrow brown line crosses the middle of the median branches of the primaries, and crossing to the secondaries curves within the space between the first median branch and the submedian nervure and passes to the inner margin; the secondaries have a submarginal row of black spots surrounded by silvery white, that between the lower radial and second median branch being the largest; the margin itself at its most prominent part is rufous.

Hab. Veragua, Chiriqui (*Ribbe*).

Mus. nostr. et Dr. O. Staudinger.

3. EURYGONA AMPHIDECTA.

♂. Exp. 1·3 in. Secondaries slightly produced, outer margin distinctly dentate; above brownish red; costa and outer margin of both wings (the secondaries only as far as the middle of the outer margin) deep brown: beneath nearly uniform brown; a common narrow band runs beyond the cell across the primaries, and curving gradually on the secondaries passes to the inner margin; a black spot with white outer edge near the margin of the secondaries between the lower radial and second median branch; between it and the anal angle are five similar smaller spots; margin at the anal angle rufous; inside the spots is an indistinct band parallel to the margin.

♂. Exp. 1·5 in. Earthy brown, each wing paler in the middle, with a central spot as dark as the margin; beneath paler, nearly uniform, the dark bands more distinct than in the male, and the secondaries with a row of submarginal nearly obsolete dark spots, and a similar row of less defined spots round the outer margin of the primaries.

Hab. Veragua, Chiriqui (*Ribbe*).

Mus. Dr. O. Staudinger.

4. EURYGONA INCONSPICUA.

♀. Exp. 1·1 in. Secondaries rounded; upper surface uniform pale earthy brown, rather darker about the apex of the primaries; through this colour the bands of the underside are faintly seen: beneath whitish tinged with fawn-colour; a rufous band crosses both wings through the end of the cell in each, and turning sharply between the first median branch and submedian nervure of the secondaries passes to the inner margin; a second band crosses the primaries between the end of the cell and the apex; the outer margin of the same wings is dark but less rufous than the bands; on the secondaries is a submarginal row of black spots, those on either side of the median nervure being the largest (the lower one larger than the other) and nearly round; those near the anal angle are linear and surrounded by white; the margin of the secondaries is narrowly rufous, and a dark band runs between the large black spots and parallel to the inner band from the costa to where the inner band turns to the inner margin.

Hab. Costa Rica, Cache (*H. Rogers*); Veragua, Chiriqui (*Ribbe*).

Mus. nostr. et Dr. O. Staudinger.

5. EURYGONA RUSSATA.

♀. Exp. 1·5 in. Above brown, a large fulvous spot on the median branches of the primaries; secondaries, except the margin next the apex, red-brown, darker than the spot on the primaries: beneath greyish white; marginal fourth of the primaries darker; a narrow dark band crosses the primaries beyond the cell, and following irregularly the curve of the margin of secondaries passes to the inner margin; a submarginal row of black subtriangular spots edged with

white on the secondaries, that between second median branch and lower radial the largest.

Hab. Veragua, Chiriqui (*Arcé*).

Mus. H. Druce.

6. LIMNAS MELANOCHLORA.

♂. Exp. 1.3 in. Above black, with a broad central stripe of rich orange passing longitudinally through both primaries and secondaries from base to outer margin: beneath, as above, but somewhat more subdued in colour.

Hab. Veragua, Chiriqui (*Ribbe*).

Mus. nostr. et Dr. Staudinger.

Obs. Allied to *L. bryaxis*, but the wing-stripes narrower and their edges parallel; their colour, too, is orange instead of yellow.

7. LIMNAS CÆRULEATA.

♂. Exp. 1.55 in. Above dark, with a rich blue gloss; across the primaries to the costa, a little beyond the middle, a distinct orange-yellow band with parallel edges: beneath dark blue-black, with the band of the primaries as above; between the submedian and median nervures, and between the median branches of the secondaries are blue-grey streaks, which become more distinct near the anal angle.

Hab. Veragua, Chiriqui (*Ribbe*).

Mus. nostr.

It will probably be necessary to remove this species, *L. bryaxis*, and *L. melanochlora* from *Limnas* and place them in a distinct genus.

8. CYRENIA PYRIPPE.

♂. Exp. 1.8 in. Allied to *C. martia*. Secondaries shorter, and outer margin less produced and rounded; the white and red spots of the secondaries above nearly obsolete; beneath the white spot of the same wings is oval instead of round, and placed nearer the outer margin.

Hab. Veragua (*Arcé*).

Mus. nostr.

9. ITHOMEIS IMITATRIX.

Ithomeis eulema, Butl. & Druce, P. Z. S. 1874, p. 353 (nec Hew.).

♂. Exp. 2.15 in. Primaries and margin of the secondaries black; a curved row of six ochraceous spots nearly parallel to the outer margin of the primaries, the three nearest the costa elongated; three similar spots, one near the end of the cell and one on each side of the second median branch; an obsolete streak between the median and submedian nervures, and the secondaries (except the margin) tawny red; four small yellow spots within the black margin of the secondaries: beneath as above, the spots in the margin of the secondaries being larger and seven in number; this black margin passes on to the base of the wing, leaving the basal half of the costa tawny red.

Hab. Veragua and Costa Rica.

Mus. H. Druce.

Obs. Allied to *I. eulema*, from which it differs in the primary wings being black almost to the base, and in the deeper tint of the tawny red of the secondaries.

10. *SYMMACHIA RHACOTIS*.

♂. Exp. 1·2 in. Allied to *S. domitianus*, from which it differs above in having a green patch near the anal angle of the secondaries instead of a submarginal line of the same colour; beneath the colour is paler and more ochraceous, and the metallic spots more numerous and more regularly dispersed over the whole under surface of the wings.

Hab. Guatemala, Polochic valley (*Hague*); Honduras, S. Pedro (*G. M. Whitely*).

Mus. nostr.

11. *MESENE IGNICAUDA*.

♂. Exp. 1·0 in. Above black, a spot on the inner margin of either secondary and the abdomen red; beneath dark brownish, profusely spotted with black grey-edged spots.

♀ like the ♂; but the red spot extends across the secondaries and nearly to the end of the cell of the primaries; beneath the red spot of the primaries appears as above; abdomen dark.

Hab. Veragua (*Arcé*).

Mus. nostr.

Obs. Allied to *M. ærope*, but the red of the secondaries more restricted, and the abdomen red instead of black.

12. *MESENE SILARIS*.

♂. Exp. 1·05 in. Margins of both wings (except the inner broadly) brownish, enclosing a pale lemon-yellow patch common to both wings; beneath exactly as above.

Hab. Nicaragua, Chontales (*Belt*).

Mus. T. Belt et nostr.

Perhaps allied to *M. pyrippe*, but differing both from it and all its immediate congeners by the paleness of the inner portion of the wings (in *M. pyrippe* these are red) and by the breadth of the dark border.

13. *MESENE TYRIOTES*.

♂. Exp. 1·1 in. Above brownish black, a broad band of orange red crossing the middle of both secondaries and the body; beneath uniform brownish black, rather paler than above.

♀ dark brown, a band of orange-red (paler than in the male) crossing the primaries from the middle of the costa to the anal angle; beneath as above, but rather paler in colour.

Hab. Veragua, Chiriqui (*Ribbe*), Calobre (*Arcé*).

Mus. nostr.

Obs. A close ally of *M. sagaris*, in which the orange band in the

male passes onto the primary wings. In the present species this band is restricted to the secondaries.

14. *PACHYTHONE GIGAS*.

♀. Exp. 1·65 in. Black, with a large ovate spot in the apical third of the primaries, another, pointed, at the base of the wing, and extending along the inner margin, but not reaching to the costa, and the secondaries, except the margin, pale yellow; beneath as above, the margin of the secondaries not extending over the whole of the costa.

Hab. Panama (*Ribbe*).

Mus. Dr. O. Staudinger.

Obs. In coloration this species resembles the female of *Aricoris gelasine*, described by Westwood as *A. myrtis*. The very minute palpi and the short antennæ indicate its proper position in the genus *Pachythone*. It is, however, much larger than any member of the genus hitherto described.

15. *CHARIS VELUTINA*.

♂. Exp. 1·15 in. Dark brown above, with darker obsolete bands on the central portion of both wings, arranged more or less concentrically, two subparallel submarginal metallic bands on both wings, the inner one on the primaries irregular and interrupted: beneath rich dark purple with obsolete black spots corresponding in position with the indistinct bands of the upper surface; a single narrow submarginal metallic band much interrupted on the anterior wings; cilia of both wings dark with small white equidistant spots.

Hab. Guatemala, Polochic valley (*H. Hague*).

Mus. nostr.

Obs. Allied to *C. iris*, Staudinger; but the under surface differs in being purple instead of rich indigo-blue. In *C. iris* the fringe of both wings is pure white; in the present species it is dark with but few white spots.

16. *CHARIS CROCEA*.

♂. Exp. 1·15 in. Above rich orange-red, with dark spots along the costa, outer margin of the primaries, and outer and inner margins of secondaries; those on the outer margin of the primaries almost confluent, and with the marginal row of the secondaries containing the metallic spots characteristic of the genus; the inner area of the wings devoid of spots: beneath, as above, but the spots of the costa more confluent and those of the outer margin of the secondaries less so; the spots, too, are generally dispersed over the wings.

Hab. Veragua, Calobre (*Arcé*).

Mus. nostr.

Obs. Allied to *C. perone*, which it resembles as to colour; but the spots above are fewer in number and not so generally distributed.

17. *CHARIS HOLOSTICTA*.

♀. Exp. 1·08 in. Above lemon-yellow sprinkled with small dark

spots nearly evenly distributed over the whole area of the wings; a submarginal metallic line round the outer margin of both wings: beneath as above, the yellow colour being a little paler and the spots slightly larger.

Hab. Veragua (*Arcé*).

Mus. nostr. et H. Druce.

Obs. Also allied to *C. perone*, but the ground-colour lemon instead of orange-yellow, and the spots on the wings rather fewer in number.

18. CHARIS PÆCILOPTERA.

♀. Exp. .95 in. Above pale greyish brown, profusely spotted with yellowish-white spots, those on the primaries gradually becoming larger towards the outer margin, the margin itself being broadly unspotted, except a submarginal row of minute spots, joining which on their outer sides are small black spots; the submarginal metallic spots, though present, are scarcely visible: beneath, the primaries as above, but the secondaries are silvery-white with a few irregular dark spots chiefly in the region of the costa.

Hab. Veragua, Chiriqui (*Ribbe*).

Mus. Dr. O. Staudinger.

19. CHARIS OCHRIAS.

♂. Exp. 1.2 in. Above white with a slight yellowish tint; primaries with four black spots along the costa, one at the apical angle, two on the outer margin, one at the anal angle, two on the inner margin, and one within the area of the wing beyond the cell; secondaries with six black spots round the edge and three within the area of the wing; submarginal metallic line (as usual in the genus) but feebly developed: beneath precisely as above.

Hab. Costa Rica, Irazu (*H. Rogers*).

Mus. nostr.

Obs. Allied to *C. sulphurea*, R. Felder (with the type of which it has been compared), from Mexico, from which it differs in being paler in colour and in having all the spots on the outer margin larger; there is also a spot on the inner margin of the primaries, wanting in *C. sulphurea*.

20. THAROPS PURPURATA.

♂. Exp. 1.5 in. Above rich purplish blue, apical portion of primaries and apex of secondaries brownish black; some dark elongated transverse spots on the distal two thirds of the primaries: beneath greyish white, apex of primaries and outer margin of both wings brownish; small brownish spots over the whole under surface, those nearest the apical and anal angles of the secondaries slightly the largest.

♀ like the male, but the wings more obtuse, and the secondaries above, like the primaries, crossed with dark marks.

Hab. Guatemala, Polochic valley (*Hague*); Veragua (*Arcé*).

Mus. nostr.

Obs. Allied to *T. menander*, but more purple in tint above; beneath purer white, and the spots at the apical and anal angles of the secondaries smaller. In colour it resembles *T. coruscans* and *T. nitida*, but differs from both in the arrangement of the spots of the under surface.

21. THAROPS ISTHMICA.

♂. Exp. 1.5 in. Allied to *T. splendida*, but smaller, and the anal angle of the secondaries less produced: beneath the ground-colour is nearly uniformly sprinkled with pinkish scales, the central area of both wings in *T. splendida* being decidedly whiter; there are no conspicuous spots at the apical and anal angles of the secondaries, and the spot on the costa is much smaller.

Hab. Veragua, Calobre (*Arcé*).

Mus. nostr.

22. LEMONIAS PELARGE.

♂. Exp. 1.33 in. Primaries, base, and narrow outer margin of secondaries dark brown; some indistinct blue spots near the apex of the primaries; a spot near the anal angle of the primaries and the inner area of the secondaries reddish orange: beneath grey sprinkled with dark scales; proximal half of both wings with distinct black spots; outer marginal area of both wings darker, variegated with lighter marks, especially at the apical angle of both wings and the anal angle of the primaries.

Hab. Guatemala, Polochic valley (*H. Hague*).

Mus. nostr.

Obs. Allied to *L. parthaon*, in which the blue spots of the primaries are very distinct; in the present species the orange of the secondaries extends almost to the costa: beneath the primaries have much more blue-grey, and the submarginal spots of the secondaries are obsolete, being large in *L. parthaon*.

23. LEMONIAS THEAGES.

♂. Exp. 1.05 in. Above dark brown, central area of secondaries to the inner margin, and numerous spots over the margin of the secondaries and the whole area of the primaries (two, one at the end of the cell and one below it, the largest), white; beneath as above, except that the base of the secondaries is white, and bears several black spots.

Hab. Veragua (*Arcé*); Costa Rica (*Rogers*).

Mus. nostr.

Obs. Allied to *L. orpheus*; but the white spots of the primaries are much larger, and the dark margin to the secondaries broader.

24. LEMONIAS DEBILIS.

♂. Exp. 1.2 in. Dark brown above irrorated with ochraceous scales, dark brown spots with ochre margins irregularly dispersed over both wings, except along the outer margin of both, where they lie contiguous to one another, forming a submarginal row: beneath as

above; but, the ochraceous scales being more numerous than the brown ones, the under surface has a paler tint.

♀ like the male, but with the wings less pointed.

Hab. Veragua, Chiriqui (*Ribbe*); Nicaragua, Chontales (*Belt*).

Mus. nostr. et T. Belt.

25. LEMONIAS HYPOGLAUCA.

♀. Exp. 1.15 in. Outer margin of primaries curved outwardly; the apex slightly falcate: above greyish brown with blackish spots dispersed over the surface of both wings, those within and below the cell of the primaries the largest; the spots on the secondaries are arranged in two submarginal rows which follow the curvature of the outer margin; and an irregular cluster in and about the end of the cell: beneath whitish, with spots corresponding to those of the upper surface, those on the primaries dark, those on the secondaries rufous.

Hab. Mexico.

Mus. H. Druce.

Besides this specimen in Mr. Druce's collection, we have seen others in the Berlin Museum.

26. NYMPHIDIUM HÆMATOSTICTUM.

♂. Exp. 1.6 in. Costa and outer margin of primaries dark brown, a triangular patch with its base on the inner margin and apex towards the apical angle, an isolated spot near the apex, and the whole central portion of the secondaries white; a submarginal row of black spots on both wings, bounded on either side by narrow blue-grey waved lines; margin of the secondaries inwardly red for two thirds of its length from the anal angle, the rest and a narrow margin dark brown: beneath with the margins as above, but with the inner irregular line encircling the black submarginal row of spots nearly white; two irregular white spots on the outer margin of the primaries, one near the middle and one near the apical angle; the red of the secondaries more restricted.

Hab. Panama (*Ribbe*).

Mus. Dr. O. Staudinger.

27. NYMPHIDIUM ICTERICUM.

♂. Exp. 1.6 in. Base of secondaries and primaries ochre-brown; a broad band, constricted in the middle, passes from the middle of the costa towards the middle of the outer margin, a large irregular spot from the anal angle halfway along the inner margin, an irregularly defined double submarginal row of spots, and the whole of the remainder of the secondaries ochre-yellow; across the cell and the region of the median nervure are some obsolete dark transverse bars: beneath as above, but slightly paler.

♀ like the male, but less ochraceous in tint, the lighter markings being purer yellow.

Hab. Veragua (*Arcé*); Chiriqui (*Ribbe*).

Mus. H. Druce (♂), Dr. O. Staudinger (♀).

28. *NYMPHIDIUM SICYON*.

♂. Exp. 1·6 in. Costa of primaries, base, and outer margin of both wings dark brownish-black; inner margin and central area of both wings yellowish ochre; in the dark margin of the secondaries are two parallel yellowish submarginal lines, between which are a series of black spots: beneath paler than above; the submarginal lines in the border of the secondaries are absent; but the black spots are present.

Hab. Guatemala, Polochic valley (*H. Hague*).

Mus. nostr.

Obs. Allied to *N. agle*, but the outer margin darker, and the margin of the primaries and secondaries are without the rufous band contained in that of *N. agle*.

29. *NYMPHIDIUM ADELPHINUM*.

♂. Exp. 1·85 in.; ♀, exp. 2·15 in. Closely allied to *N. lycorias*, of which it is a more southern race; it differs in having the white band in the dark margin of the secondaries almost obsolete in the male instead of a biconvex conspicuous spot; the white spot near the middle of the outer margin of the primaries is much smaller: beneath, these spots, though more distinct, are not nearly so large as in the allied species.

Hab. Costa Rica, Irazu (*Rogers*); Veragua, Calobre (*Arcé*).

Mus. nostr.

30. *NYMPHIDIUM VELABRUM*.

♂. Exp. 1·8 in.; ♀, exp. 1·95. Allied to *N. phliasus*; but the white band common to the two wings is broader, and on the primaries extends just into the cell instead of merging in the fulvous band of the same wings; this fulvous mark, in the present species, is restricted to an isolated spot in the apical area of the primaries. In the relative position of the white band and the fulvous spot this species resembles *Adelpha iphiola* and its allies, whereas *N. phliasus* resembles *A. cocala*.

Hab. Veragua, Calobre (*Arcé*).

Mus. nostr.

31. *THEOPE ISIA*.

♂. Exp. 1·25 in. Costa, apex (narrowly), outer margin of primaries, and cilia of secondaries dark brownish-black; secondaries and a subtriangular patch occupying from the inner margin to the end of the cell of primaries blue: beneath uniform orange.

Hab. Guatemala, Polochic valley (*H. Hague*).

Mus. nostr.

Obs. The distribution of the blue of the upper surface resembles that of *T. hypoxanthe*; the colour of the under surface is paler and purer yellow, being almost exactly the tint of the under surface of *T. eudocia*.

32. THEOPE BAREA.

♂. Exp. 1·15 in. Cell of the primaries nearly to the end, the inner margin (broadly), and the whole of the secondaries dark shining blue with a slight purple tinge; rest of the primaries dark brown with a slightly lighter central patch: beneath uniform rather dark lemon-yellow.

♀. Exp. 1·1 in. Primaries dark brown, a patch of blue covering from the inner margin to half the cell, and passing beyond it, but leaving the outer margin and costa broadly dark; secondaries the same blue colour, apex and outer margin (narrowly) dark brown; beneath the same as the male, the yellow colour being hardly so bright.

Hab. Veragua (*Arcé*); Chiriqui (*Ribbe*).

Mus. nostr. (♂), et Dr. O. Staudinger (♀).

Obs. In the colour of the upper surface this species is like *T. aureonitens*, but the blue is darker, as well as the apex of the primaries; the colour beneath is much paler yellow.

33. THEOPE CÆNINA.

♂. Exp. ·95 in. Inner margin of primaries and cell nearly to the end and whole of secondaries dark shining blue slightly tinged with purple; rest of the primaries dark brown; beneath uniform pale dirty ochraceous yellow.

Hab. Veragua, Chiriqui (*Ribbe*).

Mus. nostr.

Obs. Allied to *T. barea*, described above; but the colour of the under surface is more ochraceous in tint, paler and not nearly so pure in tone.

34. THEOPE DECORATA.

♂. Exp. 1·0 in. Primaries above and margin of the secondaries black; a spot on the inner margin of the primaries near the anal angle, a few scattered scales near the base of the same, and the whole central area of the secondaries blue: beneath dark brown, the apex of the primaries lighter, nearly the basal half of the costa of the primaries and the base of the secondaries yellow; a curved band of iridescent blue, seen only in a certain incidence of light, occupies the remainder of the costa of the primaries nearly to the apex, it then crosses the wing to about the middle of the outer margin.

Hab. Nicaragua, Chontales (*Belt*).

Mus. nostr. et T. Belt.

Obs. Belongs to the *T. janus* group, from which it differs in many respects.

6. On a new Species of Indian *Prinia*.

By ANDREW ANDERSON, F.Z.S.

[Received March 18, 1878.]

(Plate XIX.)

It had been my intention to write a connected account of the birds of Northern Kumaon, the result of a two months' ornithological excursion into the Alpine regions of this part of the North-western Himalayas during the summer of 1875¹. Time, however, has failed me, to say nothing of bad health and heavy official duties; so that I must leave all details for another time, and content myself for the present with offering to the Society a description of a *Prinia*, which I feel confident is new to science, and which was obtained in the Bagesur valley on the 18th June, 1875, at an elevation of between 3000 and 4000 feet.

PRINIA POLIOCEPHALA, sp. n. (Plate XIX.)

Similis P. stewarti, et fronte cinerea pileo concolori, sicut in hac specie; sed dorso brunneo nec cinereo diversa; rostro nigro; pedibus pallide brunneis; iride pallide flavida; palpebris pallide stramineis.

Long. tot. 3·8, culminis 0·45, alæ 1·7, caudæ 1·8, tarsi 0·8.

Hab. Kumaon, India.

This species is of the same group as *P. cinereocapilla* and *P. stewarti*, but is distinguished from both by trenchant characters, which may be expressed in the following synoptic table:—

- | | | |
|-----|---|-------------------------|
| a. | Back grey, as also the entire head..... | <i>stewarti</i> . |
| b. | Back rufescent brown, contrasting with the head, which is grey. | |
| a'. | Forehead grey, like the crown | <i>poliocephala</i> . |
| b'. | Forehead fulvous, crown of head grey..... | <i>cinereocapilla</i> . |

This discovery of an apparently new species of *Prinia* in a comparatively speaking well-explored country like Kumaon is an event of some interest.

I should not, however, omit to mention that I am indebted to my friend Mr. W. E. Brooks for having brought to my notice that the bird in question is apparently undescribed, and that it is not "*P. cinereocapilla*," by which name I had it catalogued in my note-book.

Unfortunately, I only obtained one specimen of the new bird, a male; but at the same place a fair series of *P. hodgsoni*, all males, was also added to my collection. Both species of Warblers were in beautiful plumage; an examination into their sexual organs indicated that the latter end of June and July must be their breeding-season; and hence probably the reason why no female examples were met with.

¹ In an article contributed by me to 'Stray Feathers' for 1875, vol. iii., entitled "Little or unknown Himalayan Oology," I have already given an account of the nidification and habits of some of the birds I met with on this occasion.



J Smit lith.

Hanhart imp

PRINIA POLIOCEPHALA

FURNAL HIST.





As might be expected, the subject of the present paper has all the habits of its near ally *P. stewarti*, for which, indeed, I mistook it on the wing. When shot it was wending its way very adroitly through dense nettle-jungle (*Girardinia heterophylla*), climbing up and down the stalks in search of mosquitoes and other insect food. The allied species to *P. policephala*, viz. *P. stewarti* and *P. cinereo-capilla*, do not apparently occur in Kumaon.

In concluding my remarks on the subject, I am glad to be able to add that the Marquis of Tweeddale concurs with me in considering the *Prinia* new to science. The Marquis writing to me respecting this species, gives his opinion in the following terms, which by his permission, I here transcribe:—"Your *Prinia* seems to be a good and distinct species."

7. Notes on three stuffed Specimens of the Sea-lion of the Pribilof Islands (*Otaria ursina*). By J. W. CLARK, M.A., F.Z.S.

[Received March 19, 1878.]

(Plate XX.)

The specimens I have the pleasure of exhibiting this evening were sent to the Museum of the University of Cambridge in October 1877, by the Alaska Commercial Company. Some time before that date the Company had most obligingly acceded to my request that they would endeavour to obtain for me some specimens of this Sea-lion, which is the most abundant of the two species found upon the islands ceded to them for trading-purposes by the Government of the United States, the other being Steller's Sea-lion (*Otaria stelleri*).

The "set of Seals," as the Secretary's letter terms them, consists of a male, a female, and a pup, from St. Paul's Island, Alaska. Those who have read Elliott's 'Report'¹ will remember that this is the island which is most thickly peopled by this species of *Otaria* and yields the greatest number of skins in each year. The skull and the bones of the arm and leg accompanied each skeleton; so that the age of the animal can be approximately ascertained. From the condition of those portions of the skeleton, and from the size of the animals as compared with the measurements given in the work above quoted and in Allen's 'Monograph'² (pp. 73-108), it is clear that they are not full-grown. This is to be regretted, as the opportunity so seldom occurs of obtaining an *Otaria* in that condition: and from the vast numbers that exist on the Pribilof Islands, I had hoped that the specimens, when they arrived, would prove to be adult. Notwithstanding this drawback, however, they are a most interesting group, and illustrate extremely well the difference in

¹ Report on the Pribilof Group or Seal Islands of Alaska. By Henry W. Elliott, 4to. Washington, 1873.

² "On the Eared Seals (*Otariadæ*). By J. A. Allen," Bull. Mus. Comp. Zool. Harvard College, Cambridge, vol. ii. p. 1.

size and build between the male and female. It is the first time, moreover, so far as I am aware, that a pair of any species of *Otaria* has been obtained from the same locality at the same season of the year, and also the first time that this particular species has been seen in this country; and I feel most grateful to the Company for their generous present.

The male is 5 feet 10 inches long, measured in a straight line from the tip of the nose to the root of the tail. The general colour of the pelage is a black inclining to grey; and the hairs are 1 inch long. A closer examination shows that the grey tint is due to the presence of white hairs intermingled with the black ones. On the neck, right across the whole superior surface, from the back of the head to the shoulders, the hair is much coarser, and individual hairs are exactly twice as long as on the back. There are a great many more white hairs on this part. The hair is equally long under the throat, but not along the sides of the neck. The shaggy appearance presented by this part of the pelage in an animal no older than our specimen gives an indication of what it must be in full-grown or aged individuals, and fully accounts for the "mane" so often described by the early voyagers. The muzzle is of a light brown, with very short hair. There is a patch of light-brown hair near the ear. The arm is destitute of hair near the distal end of the radius and ulna. There is a patch of a slightly rufous tinge behind it. A thick rufous under-fur covers the back, neck, and sides of the body, but it nowhere extends further than halfway down. The hair under the belly is thinner and shorter; indeed it is extremely short on that part, and generally rather lighter in colour than on the rest of the body, especially between the hind legs. The enormous length of the cartilaginous flaps that project beyond the toes on the hind feet is characteristic of this species, and has been already noted and figured by Allen. Examination of the skull shows that the occipital crest has not yet been developed, and that the teeth are unworn. The canines have not reached their full size. The epiphyses of the bones of the arm and leg are still quite distinct.

The female measures 3 feet along the same line as in the male. The pelage is generally much closer and finer, and the under-fur thicker, and longer in proportion to the hair. No white hairs are admixed with the dark ones; but these latter have light-yellow tips, which become larger on the breast, so that that part is quite yellow. The colour under the belly is rufous, edged with a band of a lighter shade, which has a wavy outline, ascending higher just behind the arm and in front of the hind leg. The rufous tint is darkest between the fore legs. The skull shows that the animal is quite young, much younger probably than the male—an unfortunate circumstance, as we are unable to appreciate the difference in size between the sexes with the accuracy that could be wished. It will be seen that this female is just half the length of the male. Allen (*t. c.* p. 76) gives the length of an adult male as from seven to eight feet, of an adult female as four feet.

The cub (the sex of which was not noted) is of a glossy black all over the back part of the body, inclining to brown on the nose, throat, and chest. The parts under the belly, especially between the hind legs, are of a light brown; and there is a yellow patch behind the fore limb.

The differences in colour, of which it is almost impossible to give an intelligible description on paper only, are extremely well illustrated in the accompanying figures (Plate XX.).

8. Notes on the Visceral Anatomy of *Lycaon pictus*, and of *Nyctereutes procyonides*. By A. H. GARROD, M.A., F.R.S.

[Received March 18, 1878.]

Having had the opportunity in my prosectorial capacity of dissecting a male specimen of *Lycaon pictus*, as well as several, both male and female, of *Nyctereutes procyonides*, I take the present opportunity of giving the results at which I have arrived.

Lycaon pictus.—This canine animal, so different from its allies in its digitation, is not at all aberrant in its visceral anatomy, which has not been previously described, so far as I am aware. The following are some of the most important details:—

The anterior portion of the palate is black, the pigment extending back as far as half an inch, onto the soft palate, of which the posterior one and a half inch is unpigmented. There is no uvula, a median shallow notch occupying its position. The tonsils are elongate, lunate, and vertical in position.

On the tongue the filiform papillæ are all small; and among them small papillæ fungiformes are sparsely scattered. Three circumvalate papillæ on each side, increasing in size from before backwards, and converging posteriorly, form the normal V. There is no trace of a lytta.

Of the salivary glands the compact submaxillaries are slightly larger than the irregularly shaped parotids. The zygomatic glands are as big as small chestnuts. The accessory submaxillary (or sublingual) glands are situated nearly in contact, in the middle line of the floor of the mouth.

The thyroid gland is formed of two parts, each of the size of a sheep's kidney, these being joined at the inferior internal angle by a narrow isthmus of thyroid tissue. The superior thyroid artery is enormous.

The stomach presented no differences from that of *Canis familiaris*. The following are the lengths of the intestines:—

	ft.	in.
Small intestine	9	1
Cæcum	0	7
Large intestine	1	3

The cæcum is quite caniform, its curves being exactly represented in that of *Canis familiaris*¹.

The liver is deeply fissured, upon the same plan as in all the Canidæ—and all the Carnivora, in fact,—the cystic fissure being very deep, which allows the fundus of the gall-bladder to appear on the diaphragmatic surface of the organ. The left lateral lobe is the largest, the right central and right lateral being slightly smaller. These last are half as large again as the caudate and left central, which are at least four times the bulk of the Spigelian, upon which latter there is a small accessory lobule.

In the generative organs, as in all Canidæ, the prostate is large, whilst Cowper's glands and the vesiculæ seminales are absent. The os penis is large, quite straight, four inches in length, and deeply grooved, as in all the Canidæ, along its lower surface.

In the lungs there are three lobes to the left, and four to the right, one of the latter being azygos. The median lobes of both sides are the smallest; the inferior the largest. The fissures between the lobes are all deep.

The brain of *Lycaon pictus* is perfectly dog-like, resembling that of *Canis lupus* (as figured by Leuret and Gratiolet²) in almost every detail, the division of the posterior limb of the gyrus third above the Sylvian fissure extending as far forward on the superior cerebral surface as in that species, or even further, the anterior superior angle of the gyrus next below it being rather more strongly developed. The sulcus between the uppermost (or fourth) gyrus and the third is parallel to the great longitudinal fissure between the hemispheres.

In *Nyctereutes procyonides* the tongue is covered with filiform papillæ smaller in size than in *Lycaon pictus*, allowing the proportionally larger fungiform papillæ to appear more conspicuously among them. These latter posteriorly become the papillæ circumvallatæ, five on each side, larger posteriorly, and arranged in a V-manner.

There is no uvula; and the soft palate embraces the upper end of the larynx with facility.

The stomach is not peculiar, except that it is more than usually muscular at its pyloric end.

In an adult male which died on the 2nd of February last, the father of a litter of six born on May 2nd 1877, the small intestine measured eight feet; the large, one foot and an inch, the cæcum being two inches long, rounded at the end, and slightly turned to the left side apically. It is figured in the accompanying sketch.

In three other specimens, not adult, the following were the intestinal lengths:—

¹ Vide P. Z. S. 1873, p. 748, fig. 13.

² Anatomie comparée du Système Nerveux (Paris: 1839-1857), pl. iv. fig. Loup.

	♀, half-grown.	♀, a month old.	♀, a month old.
Small intestine	4.25 feet.	5.75 feet.	7.3 feet.
Large intestine	6 inches.	8 inches.	8 inches.
Cæcum	1.25 inches.	1.5 inches.	2 inches.

There is evidently not much constancy in the length of the viscera, even in specimens of the same age and sex.



Cæcum of *Nyctereutes procyonides*.

The liver differs from that of *Lycaon pictus* and other Canidæ in the great size of the Spigelian lobe. In this the accessory lobule, referred to above, is enlarged to form part of the lobe itself, which is, by its presence in a semi-independent condition, rendered bifid apically. In the depth of the cystic fissure, and all other respects, it is quite caniform.

The lungs are not peculiar, the fissure between the left upper and middle lobes only being less developed than in many of its allies. The azygos lobe is present on the right lung.

The prostate is well developed; Cowper's glands are absent, as are the vesiculæ seminales. The os penis is three inches in length, straight, and deeply grooved inferiorly to transmit the urethra. The glans penis is bluntly conical, the urethra opening terminally, much as in the American Cervidæ.

In *Nyctereutes procyonides* the brain is perfectly caniform. The posterior limb of the third convolution is bifurcate, the bifurcating sulcus not being lengthy, going upwards and forward with-

out having any extension directly onwards to the anterior extremity of the hemisphere. There is scarcely any tendency in the second gyrus to form an antero-superior angle; and the sulcus between gyri three and four is not quite parallel to the great longitudinal fissure, it diverging slightly from the middle line as it goes forward. In these respects the brain more resembles that of *Canis vulpes*¹ than those of *Canis familiaris* or *C. lupus*.

In the peritoneal cavity of the adult male *Nyctereutes* (which, like the half-grown female, had excessive atheroma of all its larger arteries) I found an immense number of parasitic worms, collected especially about the abdominal surface of the liver and the stomach.

These worms had "heads" much like those of the *Bothriocephali*, but larger. My friend Mr. F. G. Penrose has most kindly made sections of them, and has demonstrated the existence of a most peculiar cavity in each. This cavity is coiled up within the ovate "head;" its lumen is small; and its walls are plicated very extensively, the magnitude as well as the number of the folds being great. It opens externally at its proximal extremity by one of its ends only. The "body" is tænioid in its proportions, and is not segmented. It is about two and a half inches in total length, the "head" being about the size of a hemp-seed or a little smaller.

There are a few general remarks suggested by the above recorded facts.

First, with reference to the colic cæcum in the Canidæ, I have on a previous occasion noticed the aberrant form of that appendage in *Canis cancrivorus*², where it is nearly straight. Two other specimens of the species have since passed through my hands, which have been entirely confirmatory of my earlier observation. In *Nyctereutes procyonides* the cæcum is slightly more caniform than in *C. cancrivorus*; it is a little broader also.

From the examination of other Canidæ, I find that the cæcum, in its twistings, resembles that of *Canis familiaris* in being turned about twice and a half upon itself in *C. laniger*, *C. lagopus*³, *C. anthus*, *C. fulvus*, *C. antarcticus*, *C. azaræ*, *Otocyon lalandii*, and *Lycaon pictus*.

In *Canis aureus* I have found the terminal twist wanting, the apex of the cæcum turning down as in *C. famelicus*.

In *Canis cancrivorus* and in *Nyctereutes procyonides* the cæcum is nearly straight.

Secondly, with reference to the brain, Prof. Flower has done much to condense and classify the facts to be arrived at from the study of the convolutions⁴, which latter, in my estimation, throw much light upon the mutual affinities of the Fissiped Carnivora.

It seems to me that the typical major convolutions of the Carnivorous brain form three complete and uniformly broad gyri round

¹ Leuret and Gratiolet, *loc. cit.* pl. iv. fig. 2, Renard.

² P. Z. S. 1873, p. 748.

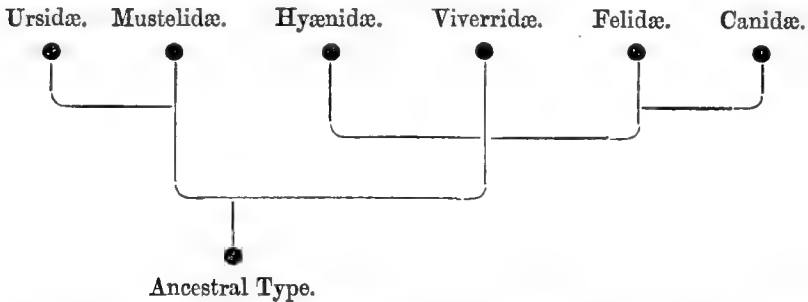
³ Vide Flower. "Hunterian Lectures," 'Medical Times and Gazette.' London, June 1st, 1872, p. 622.

⁴ P. Z. S. 1869, p. 482.

the Sylvian fissure, which in the Mustelidæ and in the Genets remains as such, notwithstanding that these two latter groups had otherwise diverged before the brain began to modify. From the Musteline animals (the Arctoid ancestral type) the Ursidæ seem to have diverged, the superior or third cerebral convolution broadening and tending to divide, whilst the others persist unmodified.

Those Viverridæ which are more modified than the genus *Genetta*, acquire a broadening of the lowest or first circum-Sylvian convolution, especially in its posterior limb, in which a perpendicular sulcus is formed; and this peculiarity is more strongly marked in *Hyæna*, as well as in *Proteles*. In the Felidæ the anterior as well as the posterior limb of this first circum-Sylvian gyrus broadens, and becomes perpendicularly bisected to such an extent that if in them there were a longitudinal sulcus developed in the upper median portion of the gyrus, a complete secondary gyrus would appear. Such a gyrus, evidently thus originating, is found in the Canidæ, in which the extra convolution is therefore a reduplication of the first, dependent on the differentiation off of its outer moiety.

On the assumption of the correctness of this hypothesis, the classification of the Fissiped Carnivora might be represented thus:—



By Prof. Flower¹, after a most careful analysis of their cranial and other peculiarities, the Canidæ are placed between the Arctoidea and Æluroidea; but from the same facts Mr. H. N. Turner² placed the three major groups in the same order of sequence that the brain-markings indicate, namely Ursidæ, Felidæ, and Canidæ, which makes it evident that such an arrangement is not opposed to the teaching of the parts other than the cerebral hemispheres.

April 2nd, 1878.

Prof. Newton, F.R.S., V.P., in the Chair.

The Secretary read the following report on the additions to the Society's Menagerie during the month of March 1878.

The total number of registered additions to the Society's Menagerie during the month of March was 74, of which 32 were by pre-

¹ P. Z. S. 1869, p. 4.

² P. Z. S. 1848, p. 83.

sentation, 7 by birth, 7 by purchase, 4 were received on deposit, and 24 by exchange. The total number of departures during the same period, by death and removal, was 105.

The most noticeable additions during the month of March were as follows :—

1. An Isabelline Bear (*Ursus isabellinus*, Horsf.), received in exchange from the Zoological Gardens of Calcutta, March 7th. The acquisition of this animal, which has been placed in the Bears' dens next to its near relative the Syrian Bear (*Ursus syriacus*), renders the series of Bears now living in the gardens nearly perfect. It consists of 21 individuals, referable to 11 species, as follows :—

List of Bears living in the Menagerie.

- 2 Polar Bears ♂, ♀ (*Ursus maritimus*).
- 4 Brown Bears (*U. arctos*).
- 1 Hairy-eared Bear (*U. piscator*).
- 2 Grizzly Bears (*U. ferox*).
- 1 Syrian Bear (*U. syriacus*).
- 1 Isabelline Bear (*U. isabellinus*).
- 3 Himalayan Bears (*U. tibetanus*).
- 2 Black Bears (*U. americanus*).
- 3 Malayan Bears (*U. malayanus*).
- 1 Spectacled Bear (*U. ornatus*).
- 1 Sloth Bear (*Melursus labiatus*).

2. A Le Vaillant's Darter (*Plotus levaillanti*), purchased March 9. This African species is new to the collection, although we have had several specimens of its American representative (*Plotus anhinga*), and have at present one individual of the latter species living in the fish-house. The present example is probably from Senegal; but this Darter likewise occurs all over Southern and Eastern Africa up to 12° N. lat.¹

3. Two examples of the very singular Water-tortoise of the Amazons, generally known as the Matamata (*Chelys matamata*), remarkable for the long pendent filaments on its neck. The larger of the two measures about 13 $\frac{1}{4}$ inches in length.

This species is new to the collection, and, so far as I know, has not been previously brought alive to Europe.

I take this opportunity of recording the fact that the large female Anaconda (*Eunectes murinus*), which was purchased on the 15th February, 1877, and which (as I stated P. Z.S. 1877, p. 303) began to produce young (dead) the 2nd April, 1877, continued to produce young Snakes (mostly in a more or less decomposed condition) up to about three months since, when fifteen finally came forth. In all sixty-two young were produced.

This Snake is further remarkable for its long fast. Up to the 15th March, when she killed and ate a single duck, all offers of food were refused; so that she must have fasted thirteen months.

¹ Cf. Finsch & Hartl. Vögel Ost-Afrika's, p. 841.

It is impossible to *say* how long she may have been without food previous to her arrival at the gardens. One thing is certain, however, that she could not have taken food while in the box in which she arrived from South America, as she was so closely packed as to be barely able to move.

The following papers were read :—

1. Contributions to the Ornithology of the Philippines. No. VII.—On the Collection made by Mr. A. H. Everett in the Island of Panaon. By ARTHUR, Marquis of Tweeddale, F.R.S., President of the Society.

[Received March 6, 1878.]

The small collection, of which it is proposed to give an account, was made by Mr. Everett at San Francisco, on the west coast of the small island of Panaon. This island is situated to the south-east of Leyte, from which it is separated by a narrow channel. Nor is its southern extremity distant from the most northerly part of Mindanao.

The number of species obtained is too small to permit me to draw any general conclusions as to the affinities of its ornithology. But the occurrence of the Leyte species of *Buceros* and *Thriponax*, *B. semigaleatus* and *T. pectoralis*, rather than those of Mindanao, indicates a closer affinity to the northern than to the southern island.

Panaon has never hitherto been visited by an ornithological collector.

1. *CACATUA HÆMATUROPYGIA* (1).

[Panaon, ♀, October.]

2. *PRIONITURUS DISCURUS* (2).

[Panaon, ♂, October.]

3. *THRIPONAX PECTORALIS*.

Thriponax pectoralis, Tweeddale, *anteà*, p. 340.

[Panaon, ♂, ♀, October.]

4. *CHRYSOCOLAPTES LUCIDUS* (32).

[Panaon, ♀, October.]

Crest and crown dark brown, with ruddy fulvous spots.

5. *EURYSTOMUS ORIENTALIS* (37).

[Panaon, ♂, ♀, September.]

6. *ENTOMOBIA GULARIS* (44).

[Panaon, ♂, ♀, October.]

7. *BUCEROS SEMIGALEATUS*.*Buceros semigaleatus*, Tweeddale, *anteà*, p. 277.

[Panaon, ♂, ♀, October.]

8. *LANIUS LUCIONENSIS* (72).

[Panaon, ♂, ♀, October.]

Several of the examples from Panaon have the whole head above coloured like the back, uniform liver-brown. There are females with brown-freckled breasts and flanks.

9. *GRAUCALUS STRIATUS* (74).

[Panaon, ♂, ♀, October.]

10. *DICRURUS STRIATUS*.*Dicrurus striatus*, Tweeddale, P. Z. S. 1877, p. 545.

[Panaon, ♂, ♀, October.]

11. *BRODERIPUS ACORRHYNCHUS* (90).

[Panaon, ♂, ♀, October.]

12. *MIXORNIS CAPITALIS*.*Mixornis capitalis*, Tweeddale, *anteà*, p. 110, pl. vii. f. 2.

[Panaon, ♂, ♀, September.]

13. *POLIOLOPHUS UROSTICTUS* (101).

[Panaon, ♀, October.]

14. *HYPsipETES PHILIPPINENSIS* (102).

[Panaon, ♀, October.]

15. *CRINIGER EVERETTI*.

Criniger everetti, Tweeddale, Ann. & Mag. Nat. Hist. ser. 4, vol. xx. p. 535.

[Panaon, ♂, ♀, September and October.]

16. *MONTICOLA SOLITARIUS* (103).

[Panaon, ♂, ♀, October.]

17. *CORYDALLA LUGUBRIS* (117).

[Panaon, ♂, ♀, October.]

18. *DICÆUM MODESTUM*, n. sp.

[Panaon, ♂, ♀, October.]

Above dull olive-brown. Upper tail-coverts and outer margins of the wing-feathers a brighter olive-green. Rectrices above dark brown, some narrowly edged with olive-green. Cheeks greyish brown. Chin and throat greyish white. Breast pale grey. Abdomen, ventral region, and under tail-coverts faint yellowish white.

Axillaries, wing-lining, and shoulder-edge pure white. Bill, in dried skins, black.

Wing 1·95, tail 1·00, tarsus 0·37, culmen 0·37.

This Flower-pecker closely resembles *Myzanthæ pygmæa* ♀. It differs in wanting the lively olive-green colouring of the upper plumage of *M. pygmæa* ♀, more especially on the uropygium, and the pale yellowish-green lores. The wing too is longer, that of *M. pygmæa* measuring 1·70. If the sex noted on the label is correct, this Panaon *Dicæum* is very distinct from *M. pygmæa* ♂. If the genus *Myzanthæ*, as distinct from *Dicæum*, is to be retained, *D. modestum* should belong to it.

19. CORVUS PHILIPPINUS (125).

[Panaon, ♂, October.]

20. PHABOTRERON AMETHYSTINA (139).

[Panaon, ♀, September.]

2. Description of new Lepidoptera of the Group Bombycites, in the Collection of the British Museum. By ARTHUR G. BUTLER, F.L.S., F.Z.S., &c.

[Received March 8, 1878.]

The following species are believed to be new to science:—

AGARISTIDÆ.

EUSEMIA, Dalman.

1. EUSEMIA INCONGRUENS, n. sp.

♂. General aspect of *E. africana*, but the primaries with the first ochreous spot interrupted in the centre; three ochreous dots in the form of a triangle behind them; the abbreviated subapical belt much broader, and not notched at its infero-anterior edge; the spot at external angle of twice the size; secondaries reddish orange, with the usual black border. Expanse 2 inches 8 lines.

♀. Spots of primaries paler than in the male; secondaries stramineous, with a much narrower black border. Expanse 2 inches 8 lines.

Abyssinia.

ARCTIIDÆ.

PIONIA, Walker.

2. PIONIA CALOPTERIDIA, n. sp.

Primaries purplish black, crossed by two broad yellowish bands, the first basal, the second discal and laterally bisinuate; secondaries hyaline-white, tinted towards the borders with fuliginous brown;

veins towards the base yellow; head, collar, and thorax purplish black, tawny or ochraceous at the sides; abdomen fuliginous brown, ochraceous at the sides; wings below more clearly defined than above, the costal borders alternately black and yellow; palpi and legs black and yellow; venter yellowish. Expanse, ♂ 1 inch 3 lines, ♀ 1 inch 2 lines. ♂, Pará; ♀, Venezuela (*Dyson*).

The species of this genus are marvellous mimics of the Coleopterous genus *Calopteron*.

ALPENUS, Walker.

3. ALPENUS PURUS, n. sp.

Wings snow-white; primaries with one black dot at base, one near the base of the median vein, two before the middle of costal margin, three in a triangle on interno-median interspace, and five in a curved series beyond the middle; secondaries with a spot at the end of the cell, one near the outer margin, and two near the anal angle; thorax snow-white, with a black dorsal line; collar and tegulæ spotted with black; abdomen ochreous, with a dorsal series of black spots, anus and ventral surface cream-coloured: primaries below without spots. Expanse 1 inch 7 lines. Abyssinia.

This species much resembles *Spilosoma menthastri*, but with the smooth black-spotted thorax of *Alpenus*.

TERACOTONA, n. gen.

Allied to *Phragmatobia*, but with longer and narrower primaries, the last subcostal branch with a single instead of a double furca; discocellulars distinctly angulated; secondaries more acuminate at apex; subcostal branches emitted from a very short footstalk; discocellulars more transverse, less distinctly angulated; radial emitted further from the third median branch; body much less woolly. Type, *Aloa rhodophæa* of Walker.

4. TERACOTONA ROSEATA, n. sp.

Primaries above reddish testaceous speckled with brown; a black discocellular spot and a subcostal spot near apex; secondaries rose-red, brightest on the abdominal area; a large black discocellular spot; thorax grey; head, front of collar, and inner edge of tegulæ brownish buff; a black spot on each shoulder, and one on each tegula; abdomen black, rosy at the base, a dorsal stripe, the posterior margins of the segments and the anus ochreous: wings below rosy, with black discocellular spots; borders testaceous, speckled with pale brown; primaries with an irregular transverse dusky discal belt; body below whity-brown; anterior femora above carmine, knees black, tarsi banded with black; venter ochreous at the sides, with two lateral series of black spots. Expanse 2 inches 2 lines.

Natal (*Gueinzus*).

Allied to *T. submacula* (*Spilosoma submacula*, Wlk., = *Spilosoma obscurum*, Wlk.), but with longer wings, and differently coloured.

PHAOS, Walker.

5. PHAOS VIGENS, n. sp.

Primaries dark chocolate-brown with cream-coloured margins; a discoidal streak broken into three nearly equal spots, an apical costal spot, and an angulated stripe beyond the middle (its inferior extremity terminating at the centre of the interno-median interspace in an acute spur) cream-coloured: secondaries ochreous, whitish upon costa, rosy at abdominal border; a black discocellular spot and a broad regular external black border; fringe cream-coloured: head blackish, with cream-coloured frons, collar pale ochreous; tegulæ blackish-brown fringed with pale ochreous; thorax blackish; abdomen rose-red, with a dorsal row of black dots; anus ochreous; wings below with all the paler areas broader and pale clear ochreous; body below pale ochreous, varied with blackish; anterior femora above carmine. Expanse 1 inch 4 lines. Tasmania.

We have four examples of this species, which Walker confounded with his *P. fascinula*, as he did also the four following.

6. PHAOS NIGRICEPS, n. sp.

♂. Allied to the preceding; primaries black-brown, the base, a furcate streak from the base, the apical two-thirds of costal margin, a triangulated discal stripe, an interrupted submarginal line, and the fringe cream-coloured; base of costa with a tuft of rosy hairs; secondaries rosy, with black discocellular spot, a broad black external border and ochreous fringe; head and thorax black, collar and anterior margins of tegulæ dull buff; abdomen rose-red, with transverse dorsal black bars and lateral black spots: under surface with the pale portions buff; anterior femora above carmine. Expanse 1 inch 6 lines.

♀. Basal furca of primaries only represented by a basal dash and a spot in the cell, discal stripe and submarginal line much more slender; pale portions below rosy. Expanse 1 inch 4 lines.

♂. Victoria (*Bakewell*); Sydney (*Doubleday*).

Readily distinguished from *P. fascinula* by its black head; in marking it is nearer to *P. vicens*.

7. PHAOS NOTATUM, n. sp.

♂. Primaries above dark chocolate-brown; a longitudinal dash from the base to near the middle of the cell, a broad streak from the base to the centre of the inner margin, a subquadrate spot at the middle of the costal margin, a spot below the latter intersected by the origins of the median branches, a curved macular discal stripe, the apical portion of costal margin, the fringe, and a submarginal series of spots (of which the first, second, and fifth are small, the others elongated and extended to the margin) cream-coloured: secondaries rosy with whitish costal area; a large black discocellular spot; a broad irregular black submarginal belt; thorax black, head, collar, and borders of tegulæ clothed densely with testaceous hair: body bright rose-red, with black dorsal and lateral spots: under

surface yellower than the upper, the dark areas and markings paler. Expanse 1 inch 6 lines. Sydney.

As might be expected, this species is nearly allied to *P. fascinula*, from the Hunter River; it may, however, readily be distinguished by the broad testaceous fringes to the tegulæ and the marking of the primaries.

8. PHAOS NEXUM, n. sp.

♂. Primaries black-brown; the base, an abbreviated internal streak, a quadrate spot in the cell, an abbreviated acutely angulated central band from the costa to the first median branch, an angulated discal stripe, and a broad external border enclosing a submarginal series of black spots cream-coloured; secondaries rosy, a black discocellular spot and a broad black submarginal belt, outer margin ochreous; thorax black; head, collar, and fringes of tegulæ buff; abdomen rose-red with dorsal and lateral black spots: wings below much yellower than above, the black portions slightly paler. Expanse 1 inch 4 lines. Victoria (*Bakewell*).

This species is chiefly distinguishable by the abbreviated angulated central belt, and the discal stripe almost uniting with the external border.

9. PHAOS LACTEATUM, n. sp.

Primaries cream-coloured; a nearly central angulated broad black belt, not reaching the margins, and interrupted by an irregular spot upon the median vein; a black sinuous costal stripe from the base, only separated from the black band by the subcostal vein; an oblique blackish basal streak; four black spots in a discal series before apex, and three in a pyramidal form near external angle: secondaries rose-red, with ochraceous borders; a black discocellular spot and a confluent series of unequal discal spots parallel to the outer margin: thorax black; head, collar, and fringes of tegulæ sordid buff; abdomen rose-red, with dorsal and lateral series of black spots. Under surface with the costal and internal borders tinted with rose-colour; the broad belt of primaries greyish; body below cream-coloured spotted with black; femora carmine in front, tibiæ and tarsi grey. Expanse 1 inch 6 lines. Moreton Bay (*Damel*).

This is a very distinct-looking species, and more like a typical *Arctia* than any of the other forms in the genus.

LITHOSIIDÆ.

CISTHENE, Walker.

10. CISTHENE NIVEATA, n. sp.

Primaries snow-white, sprinkled sparsely with dark brown scales; a dark brown spot at base, and a second on inner margin: secondaries with the basal half rosy whitish at costa, external half greyish brown: head and thorax white, abdomen rose-coloured: primaries below greyish brown, body below white. Expanse 8 lines.

Espiritu Santo.

MÆPHA, Walker.11. *MÆPHA DITIS*, n. sp.

Primaries bright yellow, with the veins and two marginal lines carmine; base and outer border sparsely sprinkled with black scales; two parallel irregular transverse black lines, the first central, the second discal; secondaries pink with white fringe; head and thorax bright yellow, tegulæ edged internally with carmine; abdomen pink: primaries below rosy with yellow borders and traces of two greyish transverse belts; body below cream-coloured, anterior legs and palpi rose-coloured. Expanse 6 lines. Espiritu Santo.

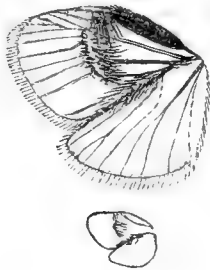
BARSINELLA, n. gen.

Allied to *Barsine* (section of *Miltochrista*), but the wings comparatively much broader, shorter, and more densely scaled; the costal margin of the primaries angulated, the under surface of these wings crossed at the end of the cell by a perfect fence of long convergent hairs; the costal margin of primaries with a central fringe of long hairs, the last two or three segments of the abdomen densely fringed with hair.

Type, *B. mirabilis*.

12. *BARSINELLA MIRABILIS*, n. sp.

Primaries bright cadmium yellow, two black spots at the base, a \lessgtr -shaped marking near the base, two irregular parallel central lines, and a discal series of dots black, a G-shaped marking at the end of the cell and the outer margin carmine, fringe golden yellow;



Barsinella mirabilis.

secondaries rose-red; head and thorax cadmium-yellow, a black spot on each shoulder; abdomen whitish: primaries below yellow, the basal half of costal border and a discal series of dots black; secondaries paler than above; body ochraceous. Expanse 7 lines.

Espiritu Santo.

NYCTEMERIDÆ.

ALETIS, Hübner.13. *ALETIS TENUIS*, n. sp.

Wings fulvous, semitransparent; primaries with the costal and external margins and a broad subquadrate apical patch enclosing a

large oblique oval white spot black ; secondaries with the apex and a more or less confluent marginal series of dots at the terminations of the nervures black ; body yellow, banded with black. Expanse 1 inch 9 lines.

Dar-es-Salem, Zanzibar (*J. & F. Moir*).

A delicate little species, resembling the New-world genus *Stenele*.

14. *ALETIS VARIABILIS*, n. sp.

♀. Ochreous ; primaries with the apical two fifths blackish, enclosing a large transparent white patch beyond the cell, and two smaller pyriform spots on the median interspaces ; secondaries with a regular blackish border enclosing nine transparent white spots, most of which touch the outer margin ; body greyish, spotted with white. Expanse 2 inches 3 lines.

Ambriz (*Monteiro*).

♀. Var. *a*. Primaries with the pyriform spots elongated into ellipses which distort the blackish border, also a third bifid spot below them completely interrupting the border near the external angle ; secondaries with the white marginal spots confluent and breaking through the border at apex.

Ambriz (*Monteiro*).

♂. Var. *b*. Primaries with all the white spots confluent, forming a large irregular hyaline patch which almost covers the disk ; secondaries with the inner edge of the marginal border only traceable near the anal angle, the white spots expanded into a broad hyaline belt, which widens gradually to the costa.

Angola, Bembe Mines (*Monteiro*).

A. variabilis is much like *Stenele lutescens*.

The other species of *Aletis* in the Museum were all placed by Mr. Walker under *A. helcita*, to which they are allied. They are as follows :—

1. *A. libyssa*, Hopffer, from Natal and the Zulu country.
2. *A. fascelis*, Linnæus, from the Congo.
3. *A. helcita*, Clerck, from Western Africa (exact locality unknown).
4. *A. druryi* = *A. helcita*, Drury, Ill. iii. pl. 29. f. 4. Sierra Leone.
5. *A. macularia*, Fabricius, from Ashanti.

Of these forms *A. libyssa* is the most decidedly distinct, the others are mere local modifications of one type differing from one another in the size and number of the white spots of primaries and the width of the black border of secondaries. Cramer's *A. helcita* is the same as that figured by Drury.

DEILEMERA, Hübner.

15. *DEILEMERA SIGNATA*, n. sp.

Allied to *D. artemis*, Boisdu, and *D. pellex*, Linn. (*Nyctemera separata*, Wlk.), but smaller than either, with the broad white postmedian patch of primaries reduced to a quarter the size, and with the dark border of secondaries of double the width. Expanse 1 inch 7 lines.

Darnley Island (*Dr. W. Y. Turner*).

CHALCOSIIDÆ.

POMPELON, Walker.

16. POMPELON AMPLIATUM, n. sp.

♀. Near to *P. marginatum* from Penang, but larger, the primaries with narrower and duller blue apical border, its inner margin dentate-sinuate; blue apical patch of secondaries extending further up the costal area; yellow spot on under surface of primaries oval and of double the size; the metallic green costal shot only traceable upon the veins, and even there of a duller bluish tint; ventral surface of abdomen with the black spots about eight times as large. Expanse 2 inches 8 lines. Celebes, near Macassar (*Wallace*).

LIPARIDÆ.

MORASA, Walker.

17. MORASA LORIMERI, n. sp.

Allied to *M. modesta* (*Sarothropyga rhodopepla* of Felder), but the primaries black mottled with whity brown, with the outer border and a biangulated discal belt of whity-brown scales, veins spotted with orange; secondaries pink, with a broad greyish outer border not quite reaching the anal angle, fringe sordid rosy; head and thorax black; abdomen rose-red with lateral tufts of ochreous hair: primaries below smoky grey, with the base ochreous; secondaries rather paler than above; body blackish, clothed with testaceous hairs; femora rose red. Expanse 1 inch 9 lines.

Tugela river, Natal.

This species was sent to me in a letter by my cousin Miss J. K. Lorimer, who caught it near the Gordon Mission station.

NOTODONTIDÆ.

ROSEMA, Walker.

18. ROSEMA FULVIPENNIS, n. sp.

♀ Primaries dull emerald-green with orange costal margin; fringe white, tipped with plum-colour and with two apical spots of the same colour, a snow-white spot at the end of the cell; secondaries bright fulvous (almost orange); thorax green, frons white, with two fulvous spots; palpi ochreous; collar chocolate-brown; abdomen fulvous: under surface bright yellow with broad reddish-orange costal borders; primaries with the outer border pale shining pinky brown; secondaries with the apical half reddish orange; legs above brownish. Expanse 1 inch 9 lines.

St. Paulo (*Bates*).

Allied to *R. dorsalis*, *zelica*, *myops*, and *costalis*.

SATURNIIDÆ.

COPAXA, Walker.

19. COPAXA GEMMIFERA, n. sp.

General pattern of *C. expansens* from Venezuela, but smaller and

with more acuminate primaries; above bright stramineous, the external area densely irrorated with red-brown scales, but leaving clear yellow patches or spots behind a submarginal series of small black spots, which are partly united by a zigzag dusky line; a straight dark brown stripe from the apex of primaries to the middle of the abdominal margin of secondaries; a very irregular dark brown line across the basal area; a small tricoloured ocellus (white, black, and yellow) with hyaline centre in the middle of each wing; primaries with the basal half of costal border lilacine grey, a broad dark brown longitudinal belt from the base to the straight oblique discal stripe, an irregular dentate-sinuate brown line from the costa to the inner margin just beyond the ocellus, a curved dark brown streak from the costa to the oblique stripe, two grey-edged apical white spots; secondaries with a regular dentate-sinuate brown line just beyond the ocellus; head, collar, and tegulæ grey; palpi and prothorax plum-coloured: wings below altogether paler than above, the markings less defined, the dark longitudinal belt of primaries obsolete; body below pale yellow, the anterior tibiæ and tarsi plum-coloured. Expanse 3 inches 8 lines. Ambriz (*Monteiro*).

We also have what seems to be a faded example of this species from Lake Nyassa; the latter, however, differs somewhat in marking, and may prove to be locally constant.

ATTACUS, Linnæus.

20. ATTACUS PRYERI, n. sp.

Allied to *A. walkeri* of Felder from N. China, but darker than any of the species of the *A. cynthia* group; olive brown, with paler borders and the usual submarginal lines; the pale belt (bounding the dark angulated central line externally) white inwardly, pinky whitish and diffused outwardly, with no defined intersecting stripe as in all the allied species; the maggot-like markings, basal white belts, and the apical markings of primaries as in *A. walkeri*. Expanse, ♂ 5 inches 10 lines, ♀ 6 inches 2 lines.

Yokohama (*Jonas*).

This species is the most undeniably distinct of all the forms allied to *A. cynthia*. I name it after Mr. H. Pryer, of Yokohama. *Attacus cynthia*, as figured by Drury, does not agree with Felder's Chinese species, but is certainly nearest to the form occurring in Java, to which Mr. Moore has given the name of *A. insularis*. It may eventually prove to be distinct from the latter, from which it appears to differ in the more angulated central transverse line; in all other characters, such as colour, the strongly dentate pale belt, and the bent form of the maggot-like marking of the primaries, it is extremely like the Javan form.





E. Oustalet del.

T. Smith lith.

CASUARIEUS EDWARDSI

3. Description d'une nouvelle espèce de Casoar (*Casuarium edwardsi*). Par M. E. OUSTALET.

[Received March 12, 1878.]

(Plate XXI.)

Parmi les animaux rapportés par MM. Raffray et Maindron de leur récent voyage en Nouvelle Guinée et acquis par le Muséum d'histoire naturelle de Paris se trouvent deux Casoars parfaitement adultes. Le premier de ces oiseaux, tué à Salwatty, en juillet 1877, est certainement le *Casuarium uniappendiculatus*, Blyth; l'autre, pris à la même époque aux environs de Dorey, ressemble au premier abord au *Casuarium papuanus*, von Rosenb., auquel j'avais été primitivement tenté de le rapporter, mais il me paraît différer essentiellement de cette espèce par la forme de son casque. M. Schlegel dit en effet (Nederl. Tijd. v. d. Dierk. iv. 53) que le *Casuarium papuanus* a le casque modelé comme le *Casuarium uniappendiculatus*. Or dans ce dernier dont j'ai, comme je l'ai dit tout-à-l'heure, un individu adulte sous les yeux, le casque est en pyramide assez élevée, la face postérieure, ovale, aplatie, étant *fortement inclinée*, les faces latérales planes étant disposées en toit, le point culminant du casque se trouvant *bien en avant de l'œil*, et l'arête antérieure descendant brusquement de ce point vers le bec. Le même type de casque s'observe également dans le *Casuarium kaupi* et dans le *Casuarium westermanni* figurés par M. Sclater (Proc. Zool. Soc. 1872, p. 148 et pl. ix., et 1875, pl. xix.). Du reste, dans une lettre qu'il m'a fait l'honneur de m'écrire il y a peu de jours, M. Salvadori affirme que le *Casuarium westermanni* ne diffère point du *Casuarium papuanus* qui habite les environs de Dorey; et, d'un autre côté, M. Sclater a réuni récemment (Proc. Zool. Soc. 1875, p. 85, note) son *Casuarium kaupi* (qui n'est pas celui de M. von Rosenberg) à son *Casuarium westermanni*.

Si, comme le dit M. Schlegel, et comme cela semble probable d'après l'opinion exprimée par M. Salvadori, le *Casuarium papuanus* a le casque de la même forme que le *Casuarium uniappendiculatus* et le *Casuarium westermanni*, il est tout-à-fait impossible de rapporter à la première de ces espèces (*C. papuanus*) l'individu provenant du voyage de MM. Raffray et Maindron. Dans ce Casoar en effet, dont je donne une figure aussi exacte que possible, exécutée d'après un croquis fait par M. Maindron à la Nouvelle Guinée, immédiatement après la mort de l'animal, le casque, relativement peu élevé, et fort étroit, se confond presque par sa base avec la tête sur laquelle il repose: sa face postérieure, au lieu d'être aplatie et fortement inclinée, est légèrement excavée et *s'élève presque verticalement*; elle est en outre un peu échancrée à son bord supérieur, au point où aboutit l'arête formée par la jonction des deux faces latérales. Celles-ci sont faiblement bombées et se rencontrent suivant une ligne qui partant de la dépression signalée sur le haut de la face

postérieure, remonte jusqu'à un point situé au-dessous de l'oreille et redescend ensuite, en décrivant une légère sinuosité, mais en pente très-douce, vers le bec, qui est séparé du casque par un petit sillon transversal. Il résulte de cette disposition que le point culminant du casque n'est placé non plus comme dans le *Casuarus uniappendiculatus* en avant de l'œil, *mais notablement en arrière*. On peut noter encore que les faces latérales du casque se prolongent en pointe sur les côtés de l'arête supérieure du bec, comme on le voit dans la figure ci-jointe. Somme toute, le casque présente à peu près le même aspect que dans le *Casuarus bennetti* et, vu en-dessus, offre deux arêtes que se coupent à angle droit. La coloration des parties nues n'est pas non plus exactement celle qui est indiquée par M. Schlegel (Mus. des Pays-Bas, Struthionés, et Nederl. Tijds. *loc. cit.*) pour son *Casuarus papuanus*, les taches rouge-carmin qui occupent les côtes du cou, au-dessous des yeux et des oreilles, ne s'étendent pas jusqu'à la tache rouge-orangée qui couvre la nuque, et sont séparées de celle-ci par une teinte bleue; en outre la tache rouge-orangée se prolonge inférieurement sous forme de bandes latérales, lisérées de bleu en avant. Mais ce sont là des différences plus légères que celles que l'on constate dans la forme du casque. Ces dernières me paraissent suffisantes pour autoriser la création, en faveur de ce Casoar, d'une espèce nouvelle que je proposerai de nommer *Casuarus edwardsi*.

Le type de ma description est un mâle, adulte, tué, m'a-t-on affirmé, auprès de Dorey, sur la côte septentrionale de la Nouvelle Guinée.

En terminant je ne puis m'empêcher d'exprimer le désir de voir un ornithologiste publier une monographie complète du groupe si intéressant des Casoars, dont les espèces sont encore si mal définies, et n'ont pas été complètement figurées jusqu'à ce jour.

4. On an apparently new Species of American Pipit.

By FRANCIS NICHOLSON, F.Z.S. &c.

[Received March 28, 1878.]

During a recent examination of the American Pipits in the British Museum I came across two skins from Peru, labelled *Anthus chii*, which appear to me to be specifically distinct from that bird; and I therefore propose to name the species

ANTHUS PERUVIANUS, n. sp.

A. *Similis* A. *chii* *auct.* (A. *rufo*, Gm.) *sed dorsi plumis et tectricibus alarum latè albo nec fulvescenti marginatis; corpore subtus albedo nec flavicante, et præcipuè caudæ colore distinguendus; rectricibus duabus externis pallidè fumoso-brunneis, intus obliquè saturatiùs brunneis ad apicem ipsum albidis et versus apicem pogonii externi saturatiùs brunnescentibus.*

Long. tot. 5.1, *culmen* 0.5, *alæ* 2.45, *caudæ* 1.75, *tarsi* 0.8.

Adult male. Lark-like. Above dark brown, the feathers exter-

nally edged with dull sandy buff; the dorsal feathers dull whitish on their inner webs, producing a distinctly varied appearance: scapulars more uniform, the longer feathers with a subterminal shade of dark brown, the edges and tips being dull sandy buff; lower back and rump also rather more uniform than the rest of the back, only slightly mottled with dark brown subterminal spots: tail-feathers dark brown with nearly obsolete edges of sandy-buff, the two middle feathers margined with ashy whitish; the two outside feathers smoky brown with a faintly indicated oblique mark of darker brown on the inner web, the tips white, and the outer web distinctly darker brown towards the tip: least wing-coverts like the back; median and greater series blackish brown, very broadly edged with dull whitish; primary-coverts and primaries dark brown, narrowly edged with yellowish buff, the first long primary dull white for nearly the entire length of the outer web; secondaries brown with a tiny white tip and externally edged with dull white and sandy buff: lores and a distinct eyebrow dull whitish; ear-coverts brown, washed with sandy buff, tipped with darker brown, with whitish shafts; cheeks and under surface of body dull white, tinged with buff on the cheeks and breast; throat and abdomen uniform, the chest marked with triangular spots of brown; a distinct moustachial streak of brown; sides of body washed with fulvous brown and longitudinally streaked with dark brown; thighs and under tail-coverts buffy white; under wing-coverts and axillaries white, the edge of the wing mottled with tiny brown spots; quills brown below, whitish along the inner web; bill horn-brown, the under mandible paler; legs waxy yellow.

Hab. Peru.

Syn. Anthus rufus, Selater & Salvin, P. Z. S. 1868, p. 173.

Anthus chii, Taczanowski, P. Z. S. 1874, p. 506.

This species is of the same small size as the bird called in the British Museum and by most ornithologists *A. chii*, but more correctly by Messrs. Selater and Salvin *A. rufus*. It is not so yellow below; and this is a point that strikes the observer at once. On comparing the upper surfaces the white edgings of the wing-coverts and dorsal feathers in *A. peruvianus* are very noticeable. But the chief difference lies in the outer tail-feathers, which are white in *A. chii*, smoky brown in *A. peruvianus*. The oblique mark of dark brown on the inner web is distinct in the former, nearly obsolete in the latter. Both species have a brown mark near the tip of the outer web.

The typical specimens were collected by Mr. Henry Whitely in Peru, the male in the Cataridon valley on the 12th of February 1867, the female at Islay on the 17th of the same month.

April 16, 1878.

E. W. H. Holdsworth, F. Z. S., in the Chair.

Mr. Sclater exhibited a typical specimen of the new Fox lately described by Mr. W. T. Blanford (J. A. S. B. xlv. pt. ii. p. 321) as *Vulpes cana*, from Baluchistan, which Mr. Blanford had forwarded to him for examination. Mr. Blanford having stated (*l. s. c.*) that his species appeared to be the same as the small Bushire Fox which in his Zoology of Persia ('Eastern Persia,' vol. ii. p. 41) he had referred with doubt, after examining a young specimen living in the Society's Gardens, to *Canis famelicus*, Rüpp., had requested Mr. Sclater to investigate this point. But the comparison of the skin sent by Mr. Blanford with the animal referred to by him ('List of Vert.' 1877, no. 213 *b*, p. 62), which was still living in the Society's Gardens, showed that the two animals must belong to quite different species.

Mr. Sclater was indebted to Mr. E. R. Alston for the subjoined note upon these differences:—

"Blanford's *Vulpes cana* is quite different from your *C. famelicus* at the Gardens, which is much larger and lighter in colour. The fur of the back is dark with light tips, forming a nearly uniform grey grizzled with black *only* on the shoulders. The nape is like the back; and the outsides of the ears appear nearly black; the limbs are fulvous. The difference in size is shown in the following measurements of the skeleton of the specimen of the same animal that died¹, taken to correspond with those given by Blanford.

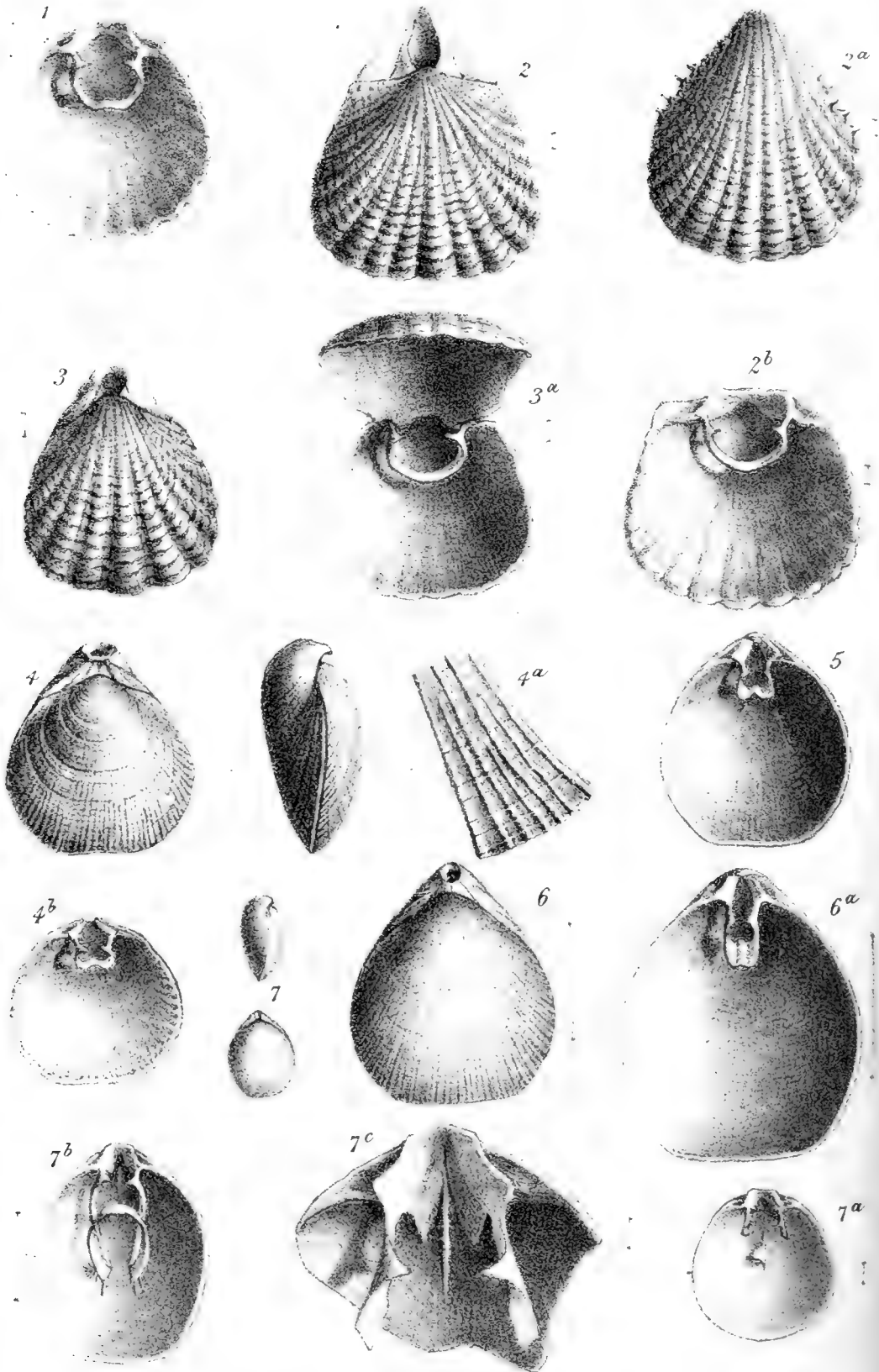
	inches.
Length of skull from occipital crest.....	5·45
Length of skull from foramen magnum	5·0
Length of nasal bones	1·80
Breadth of nasal portion	·75
Breadth of frontal region.....	·75
Breadth of brain-case	1·60
Breadth of zygomatic arches	2·95
Length of palate	2·60
Breadth of palate.....	·75
Length of last upper prem.	·52
Length of first molar	·40
Breadth of first molar	·45
Length of humerus	4·40
Length of radius	5·0
Length of femur	4·90
Length of tibia.....	5·10

Mr. E. G. Loder, F.Z.S., exhibited a mounted head of the peculiar variety of *Bos americanus*, called the "Rocky-Mountain Bison"², remarkable for its soft, dark and long hair on the forehead.

¹ No 213 *c* of 'List. of Vert.' (1877) p. 62.

² Allen's Memoir on the American Bison' pp. 39, 40.



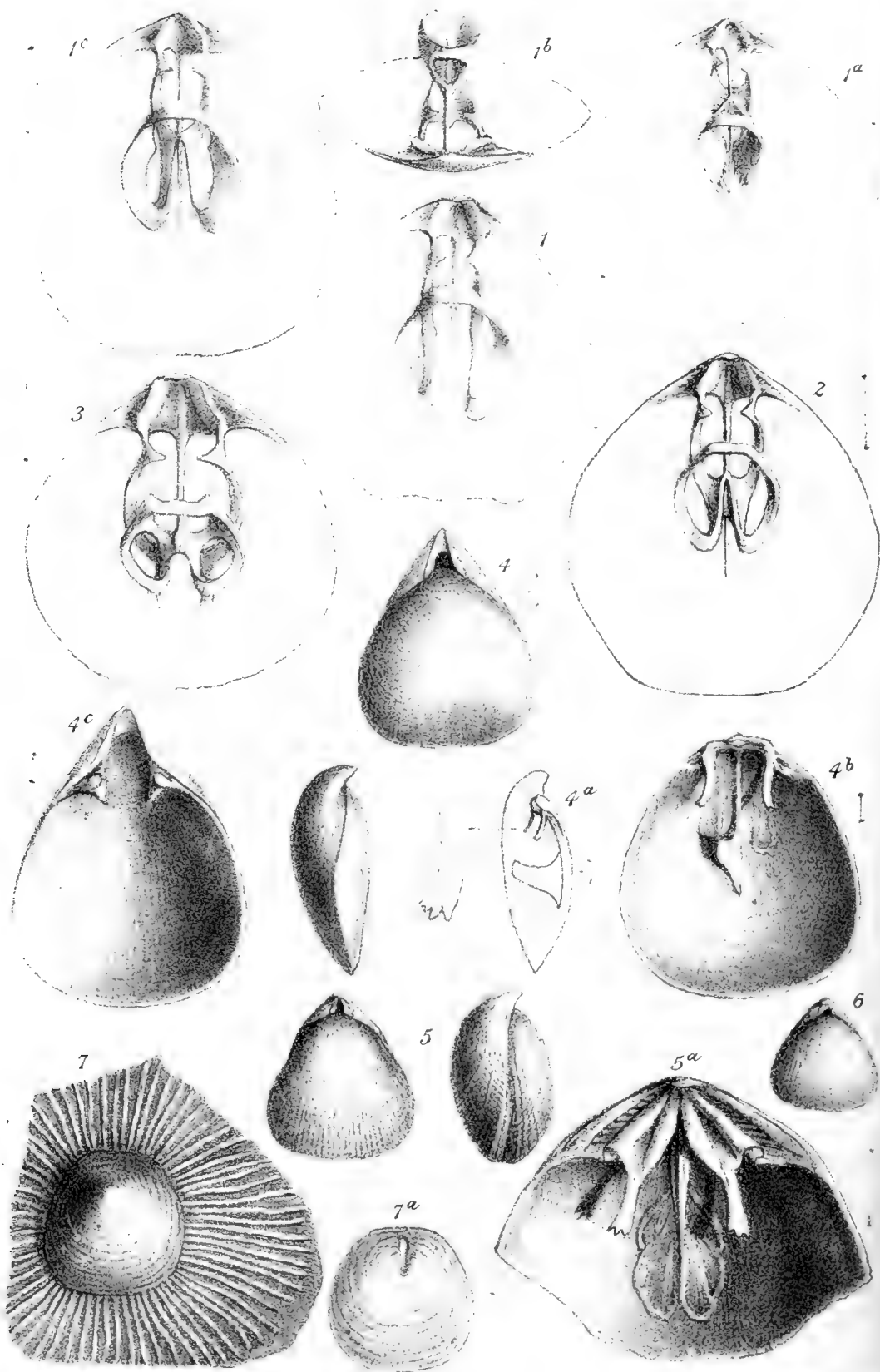


L. Davidson del. lith.

Hanhart sculp.

BRACHIOPODA OF THE
"LIGHTNING" & "PORCUPINE" EXPEDITIONS.





Thos Davidson del et lith

Harhart sculp

BRACHIOPODA OF THE
"LIGHTNING" & "PORCUPINE" EXPEDITIONS.

This specimen had been obtained about 75 miles from Denver, Colorado, in 1875.

The Secretary exhibited, on the part of Mr. A. Anderson, F.Z.S., a Bamboo driving-stick with leather thong attached, which had been taken out of the nest of an Indian Fish-Eagle (*Haliaëtus leucorhynchus*) in December 1876.

A communication was read from Prof. J. O. Westwood containing a synopsis of the Uraniidæ, a family of Lepidopterous Insects, together with a complete monograph of *Coronilia*, one of the genera of which it is composed.

This memoir will be published entire in the Society's "Transactions."

The following communications were read:—

1. On the Mollusca procured during the 'Lightning' and 'Porcupine' Expeditions, 1868-70. (Part I.) By J. GWYN JEFFREYS, LL.D., F.R.S., F.Z.S.

[Received April 5, 1878.]

(Plates XXII., XXIII.)

These expeditions were conducted under the auspices of the Royal Society; and preliminary Reports of them were published in the 'Proceedings' of that Society for 1869 and 1870.

I subjoin lists of the dredging-stations, to which I shall have occasion to refer in giving the habitats of the species hereafter described or mentioned. The stations are extracted from the Reports and accompanying Charts.

'LIGHTNING' EXPEDITION, 1868.

North of the Hebrides to the Faroe Isles.

No. of Station.	No. in Chart.	North Latitude.	West Longitude.	Depth in Fathoms.	Bottom Temperature.
					Fahr.
1.	VIII.	60° 10'	5° 59'	550	32·8
2.	IX.	60 24	6 38	170	41·7
3.	X.	60 28	6 55	500	33·2
4.	XII.	59 36	7 20	530	47·3
5.	XIII.	59 5	7 29	189	49·6
6.	III.	60 31	9 18	229	48·0
7.	XVI.	61 2	12 4	650	
8.		Off the Faroe Isles.		164 & 208	

The first column shows the stations at which dredgings were made,

and the second shows the corresponding stations in the chart; other stations, at which soundings only were taken, are omitted.

'PORCUPINE' EXPEDITION, 1869.

First Cruise.

Off the West of Ireland.

No. of Station.	North Latitude.	West Longitude.	Depth in Fathoms.	Bottom Temperature.
				° Fahr.
1.	51° 42'	11° 21'	85-110	49·0
	Dingle Bay.		30-40	
2.	51 22	12 25	808	41·4
3.	51 38	12 50	370-722	43·0
4.	51 56	13 39	251-539	49·5
5.	52 7	12 52	364	48·8
6.	52 25	11 40	90	50·0
7.	52 14	11 48	159	50·4
8.	53 15	11 51	106	51·2
9.	53 16	12 42	165	49·7
10.	53 23	13 29	85	49·5
	Galway Bay.		15-20	
13.	53 42	13 55	208	49·6
14.	53 49	13 15	173	49·6
15.	54 5	12 17	422	47·0
16.	54 19	11 50	816	39·5
17.	54 28	11 44	1230	37·8
18.	54 15	11 9	183	49·4
	Donegal Bay.		25-40	
19.	54 53	10 56	1360	37·4
20.	55 11	11 31	1443	37·0
21.	55 40	12 46	1476	36·9
22.	56 8	13 34	1263	37·3
23.	56 7	14 19	630	43·5
23 _a .	56 13	14 18	420	46·4
24.	56 26	14 28	109	46·4
25.	56 41	13 39	164	46·5
27.	Rockall Bank.		54	48·3
28.	56 44	12 52	1215	37·1
30.	56 24	11 49	1380	37·1
31.	56 15	11 25	1360	37·2
	Lough Swilly.		3-13	
	Lough Foyle.		10	
	North Channel.		40	

Dredgings were made at nearly all the sounding-stations in this cruise.

Second Cruise.

Off the South of Ireland.

No. of Station.	North Latitude.	West Longitude.	Depth in Fathoms	Bottom Temperature.
33.	50 38	9 27	74	49.6
34.	49 51	10 12	75	49.6
35.	49 7	10 57	96	51.3
36.	48 50	11 9	725	43.9
37.	47 38	12 8	2435	36.5
38.	47 39	11 33	2090	36.3
39.	49 1	11 56	557	47.0
40.	49 1	12 5	517	47.7
41.	49 4	12 22	584	46.5
42.	49 12	12 52	862	39.7
43.	50 1	12 26	1207	37.7
44.	50 20	11 34	865	39.4
45.	51 1	11 21	458	48.1
45 a.			180	
45 b.			113	

Dredgings were made at all the sounding-stations in this cruise.

Third Cruise.

North of the Hebrides to the Faroe Isles.

47.	59 34	7 18	542	43.8
51.	59 54	7 52	355	46.2
52.	60 25	8 10	384	30.6
55.	60 4	6 19	605	29.8
56.	60 2	6 11	480	30.7
57.	60 14	6 17	632	30.5
58.	60 21	6 51	540	30.8
60.	61 3	5 58	167	44.3
61.	62 1	5 19	114	45.0
62.	61 59	4 38	125	44.6
64.	61 21	3 44	640	30.0
65.	61 10	2 21	345	30.0
		East Longitude.		
68.	60 23	0 33	75	44.0
69.	60 1	0 18	67	43.8
70.	60 4	0 21	66	45.1
89.	59 38	7 46	445	45.5
90.	59 41	7 34	458	45.2
	The Minch.		60-80	
	Little Minch.		45-50	
	Near Belfast.		70	
	Loch Torridon.		40	
	Off Lerwick.		10-66	

Not many deep-sea dredgings were made during the third cruise, although soundings were taken at all the stations.

'PORCUPINE' EXPEDITION, 1870.

First Cruise.

Falmouth to Gibraltar.

No. of Station.	North Latitude.	West Longitude.	Depth in Fathoms.	Bottom Temperature.
1.	48° 38'	10° 15'	567	°
2.	48 37	10 9	305	48·5
3.	48 31	10 3	690	
3 a.			500	
6.	48 26	9 44	358	50·3
8.	48 13	9 11	257	50·0
9.	48 6	9 18	539	48·0
10.	42 44	9 23	81	53·1
11.	42 32	9 24	332	51·5
12.	42 20	9 17	128-232	52·5
	Vigo Bay.		20	
	Off Cape Mondego.		100-380	
13.	40 16	9 37	220	52·0
14.	40 6	9 44	469	51·5
16.	39 55	9 56	994	40·3
17.	39 42	9 43	740-1095	39·7
17 a.	39 39	9 39	795	49·3
17 b.			785	
19.	39 27	9 39	248	51·7
	Setubal Bay.		64	
	Off Cape Espichel.		740	
22.	38 15	9 33	718	52·0
24.	37 19	9 13	292	52·7
25.	37 11	9 7	374	53·5
	Off Cape Sagres.		45-58	
26.	36 44	8 8	364	52·7
27.	36 37	7 33	322	51·3
28.	36 29	7 16	304	53·3
28 a.			286	
29.	36 20	6 47	227	55·0
30.	36 15	6 52	386	52·7
31.	35 56	7 6	477	50·5
32.	35 41	7 8	651	50·0
33.	35 33	6 54	554	49·7
34.	35 44	6 53	414	50·0
36.	35 35	6 26	72-128	55·0
	Tangier Bay.		35	
	Gibraltar Bay.		3	

I dredged at nearly all the stations in this cruise.

Second Cruise.

Mediterranean.

No. of Station.	North Latitude.	West Longitude.	Depth in Fathoms.	Bottom Temperature.
	Algeiras Bay, Gibraltar.		1-15	
40.	36° 0'	4° 40'	586	55·0
41.	35 57	4 12	730	55·0
45.	35 36	2 29	207	54·7
	Capo de Gata.		40-69	
	Cartagena Bay.		60-84	
50.	}	Algerine Coast.	5-51	
50 a.			152	
			40-80	
	Off Jijeli.			
		E. Long.		
51.	36 55	1 10	1415	54·7
54.	37 41	6 27	1508	55·0
55.	37 30	6 51	1456	55·0
	Gulf of Bona.		25	
	Benzert Road.		40-65	
	Rasel Amoush.		45	
	Gulf of Tunis.		25-85	
	Adventure Bank.		30-92	
	Off Rinaldo's Chair.		60-160	
58.	36 43	13 36	266	56·5

Very few productive deep-sea dredgings were made during this second cruise.

Some of the new and peculiar species of Mollusca, which were procured in these expeditions, have been already described and noticed by me in the fifth volume of 'British Conchology,' the 'Proceedings of the Royal Society,' and the 'Annals and Magazine of Natural History.' I will now endeavour to complete the work, and to record all the species, with particulars of their geographical, bathymetrical, and geological distribution. Figures of the more remarkable species will also be given.

I commence with the class usually regarded as lowest in the scale of organization, or the least-specialized, among the Mollusca, viz. the

BRACHIOPODA.

Notwithstanding the long and persevering labours of that monarch of Brachiopodists, Mr. Davidson, as well as of Professor King, Mr. Dall, and other excellent zoologists, the natural arrangement and coordination of this difficult class cannot be said to be yet satisfactorily established. I prefer to steer a middle course between extreme systematists, and not to follow Professor King in making *Terebratula cranium* the type of another genus (his *Macandrevia*), nor to compress all the family of *Terebratulidæ* into the single genus *Terebra*.

tula, as Mr. G. B. Sowerby, Junr., and Mr. Reeve have done. As to *Terebratulina* and *Waldheimia*, Mr. Davidson some years ago considered both subgenera of *Terebratula*; but he is now of opinion that *Waldheimia* is a distinct genus, because (to use his own words) "the recent or living species are but a handful, in comparison with the fossil species, and these last must be taken into account when making divisions of the class, and it would be a very great advantage to retain such divisional groups, which have so many distinguishing characters, and are so numerous." I fully admit the force of his reasoning on the first mentioned ground, and that all fossil species must be included with recent species in the same scheme of classification; but the latter ground, which depends on the validity of distinctive characters and the relative number of species, is not, in my opinion, equally tenable. It is notorious that *Terebratulina* and *Waldheimia* gradually pass one into another, as well as into the main or typical genus *Terebratula*; and I contend, with great deference to Mr. Davidson's more experienced judgment, that it would be more advantageous to science not to multiply unnecessarily the generic names, when fewer would answer every purpose. It cannot be pretended that such names have any value beyond being mere symbols or signs to distinguish and recognize certain groups; they are, and must be, quite artificial and arbitrary. The question of number of species in a genus does not appear to me of much importance. Take for instance the genera *Unio*, *Helix*, and *Bulimus*, each of which, even in a restricted sense, contains several hundred species. It may, of course, be possible to divide these and other well-stocked genera into more genera, each containing an equal number of species; and the same method might be adopted with respect to the species, and even with respect to the individuals of every species. But that would hardly be a scientific proceeding; and it might cause much confusion or needless trouble. All genera ought to be equivalent as regards distinctive characters, not as regards the number of species.

I will now venture to suggest an arrangement of the few Brachio-poda which are at present known to inhabit the European seas, and which comprise the species procured in the 'Lightning' and 'Porcupine' Expeditions. The following Table gives not only the names of the species and principal varieties, but also the range of depth and the places where they have been found fossil in the Tertiary formation.

BRACHIOPODA OF THE EUROPEAN SEAS.

No. of Species.	'Lightning' or 'Porcupine.'	Names of species and varieties.	Range of depth in fathoms.	Localities where fossil.
		*Jointed.		
		A. Perforated or tubuliferous.		
		Family I. TEREBRATULIDÆ.		
		Genus I. TEREBRATULA.		
		Subgenus I. <i>Terebratulina</i> .		
1.	—	caput serpentis, <i>Linné</i>	0-1180	Coralline Crag; Scotland; Scandinavia; Belgium; South Italy; Azores.
2.	—	tuberata, <i>Jeffreys</i>	340-795	
3.	—	trigona, <i>Jeffr.</i>	500	
		<i>Typical.</i>		
4.	—	subquadrata, <i>Jeffr.</i>	500-600	
5.	—	vitrea, <i>Born</i>	5-1456	S. Italy.
		var. minor, <i>Philippi</i>	40-1000	S. Italy; Morea.
		var. sphenoides, <i>Ph.</i>	100-994	S. Italy.
		Subgenus 2. <i>Waldheimia</i> .		
6.	—	tenera, <i>Jeffr.</i>	1450	
7.	—	cranium, <i>Müller</i>	5-690	Scandinavia; S. Italy.
8.	—	septata, <i>Ph.</i>	64-725	Norway; S. Italy; Rhodes.
		Genus II. TEREBRATELLA.		
9.	—	spitzbergensis, <i>Davidson</i>	20-690	Scandinavia; Canada.
		Genus III. ARGIOPE.		
		<i>Typical.</i>		
10.	—	decollata, <i>Chemnitz</i>	18-364	S. W. France; Austria; Italy; Malta; Rhodes.
		Subgenus 1. <i>Cistella</i> .		
11.	—	neapolitana, <i>Scacchi</i>	30-130	S. W. France; S. Italy; Rhodes; Austria.
12.	—	cistellula, <i>S. V. Wood</i>	20-45	Coralline Crag; Austria; Sicily; Rhodes.
13.	—	cuneata, <i>Risso</i>	28-200	Austria; S. Italy; Rhodes.
		Subgenus 2. <i>Gwynia</i> .		
14.	—	capsula, <i>Jeffr.</i>	8-25	Norway.
		Genus IV. PLATYDIA.		
15.	—	anomioïdes, <i>Sc. & Ph.</i>	40-600	Sicily; Austria.
		Genus V. MEGERLIA.		
16.	—	truncata, <i>L.</i>	20-292	Italy; Austria.
		var. monstrosa, <i>Sc.</i>	20-292	Sicily.

BRACHIOPODA OF THE EUROPEAN SEAS (*continued*).

No. of Species.	'Lightning' or 'Porcupine.'	Names of species and varieties.	Range of depth in fathoms.	Localities where fossil.
17.		Genus VI. THECIDEA. mediterranea, <i>Risso</i>	30-300	Turin ; Sicily.
		B. Imperforate. Family II. RHYNCHONELLIDÆ.		
18.	—	Genus I. ATRETIA. gnomon, <i>Jeffer.</i>	650-1443	
19.		Genus II. RHYNCHONELLA. psittacea (rostrum-psittaci), <i>Ch.</i> ...	10-690	G. Britain and Ireland ; Scandinavia ; Canada.
20.	—	sicula, <i>Sequenza</i>	690	Sicily.
		**Hingeless. Family I. CRANIIDÆ.		
21.	—	Genus CRANIA. anomala, <i>Müll.</i>	3-808	Sicily.
		Family II. DISCINIDÆ. Genus DISCINA.		
22.	—	atlantica, <i>King</i>	690-2400	Coralline Orag.

Two new and remarkable species of *Terebratula* (viz. *T. trigona* and *T. subquadrata*) were dredged by Mr. Saville Kent in 1871 off the coast of Portugal ; and these species I propose to describe and figure, because my dredgings in the 'Porcupine' Expedition of 1870 were nearly on the same ground. Mr. Kent's discovery confirms my previous statement and unchanged impression, that we know very little of the deep-water fauna, and that it is an inexhaustible field of research. *Terebratula tenera*, from the 'Valorous' Expedition, is also figured.

I will notice very briefly the other Brachiopods of the European seas, which were not procured in the 'Lightning' or 'Porcupine' Expedition.

For the illustrations accompanying this paper, and for other valuable assistance, I am indebted to my friend Mr. Davidson.

* *Jointed.*

A. *Perforated or tubuliferous.*

Family I. TEREBRATULIDÆ.

Genus I. TEREBRATULA.

Subgenus I. *Terebratulina*. Loop, short, annular in its adult state.

1. TEREBRATULA CAPUT-SERPENTIS, Linné. (Plate XXII. fig. 1.)

Anomia caputserpentis, L. S. N. ed. 12, p. 1153: *T. caput-serpentis*, 'British Conchology,' ii. p. 14, pl. i. f. 1; v. p. 164, pl. xix., f. 2.

'Lightning' Expedition: Station 4, 530 fathoms.

'Porcupine' Exp., 1869: St. 2, 808 f., on *Oculina prolifera*; 6, 90 f.; 14, 173 f.; 16, 1180 f.; 23a, 420 f.; 25, 164 f.; 54, 363 f.; 57, 632 f.; 61, 114 f.; 65, 345 f.; 74 and 75, 203-250 f.; 77, 560 f.; 78, 290 f.; 84, 155 f.; Loch Torridon, 40 f.; off Belfast, 70 f. 1870: Atlantic, 24, 292 f.; Mediterranean; Adventure Bank, 92 f.; off Rinaldo's Chair, 60-160 f.

Spitzbergen and Davis Strait to Malta and the Adriatic; Jamaica; North-East America; Japan; Korea; Australia; New Zealand: shore to 150 f.

Extremely variable with respect to the proportional length of the shell and the number of ribs or striæ. One variety is the *T. septentrionalis* of Couthouy; and another may be called *mediterranea*, which is longer and more slender, more compressed or flatter than usual, and more or less cloven in front. In a monstrosity from the Adventure Bank the upper valve is extraordinarily convex and boat-shaped, and there are no longitudinal ribs or striæ on the outer margin.

I have figured (Pl. XXII. f. 1) the interior of a young specimen to show that the loop is not in that stage of growth completely annular or closed at the top, which is the principal characteristic of the subgenus *Terebratulina*.

The synonyms are very numerous; I have noted seventeen.

The localities for this and other Brachiopods in a fossil state will be found in the table of species.

2. TEREBRATULA TUBERATA¹, Jeffr. (Plate XXII. fig. 2.)

SHELL, upper valve ovately triangular, somewhat convex; lower valve squarish, compressed; it is solid, opaque, and lustreless: *sculpture*, about 20 fine longitudinal ribs, besides a few intermediate striæ, all of which radiate from the beak, and are closely covered with short tubercles, some of which at the sides are raised and become prickly: *cæcal tubuli* very minute and numerous: *colour* brownish white: *margins* of upper valve in front rounded and slightly scalloped by the ribs, at the sides sloping with a gentle curve, behind acute-angled: *beak* pointed: *foramen* or byssal passage oval, incomplete: *deltidium* broad, slightly excavated or concave: *hinge-plate* thick: *teeth* in upper valve small, strong, and

¹ Covered with prickles.

triangular: *skeleton* or apophysary process in lower valve consisting of a simple loop, which is attached to the hinge by short and stout crura, ending in proportionally large triangular upright points or spurs, from which proceeds the obtusely angular or nearly semicircular portion of the loop at the base; the outer surface of the crura is minutely and closely ridged across: *inside* furnished with about 10 ribs, but not with any intermediate striæ; edge notched to correspond with the furrows. L. 0·1, B. 0·085.

‘Porcupine’ Exp., 1870: St. 17a, 795 f. A single (upper) valve only.

I have also, through the kindness of Professor Lovén, a perfect specimen from the Josephine Bank off the Strait of Gibraltar, which was dredged in 340–430 fathoms.

The peculiar shape and sculpture serve to distinguish this tiny species from the young of *T. caput-serpentis*, and from the next species *T. trigona*.

3. TEREBRATULA TRIGONA¹, Jeffreys. (Plate XXII. fig 3.)

SHELL triangular, much compressed, solid for its size, semi-transparent between the ribs, and glossy: *sculpture*, 8 rounded longitudinal ribs, which radiate from the beak, and become gradually broader towards the front; those in the middle of each valve are the largest; the ribs are strongly wrinkled across by the lines of growth; the interstices or furrows are narrow: *cæcal tubuli* numerous and close-set: *colour* clear white: *margins* gently curved and scalloped in front, abruptly sloping at the sides, broad or having somewhat ear-like expansions behind: *beak* short: *foramen* oval and proportionally large, incomplete: *deltidium* small: *hinge-plate* thick: *teeth* in the upper valve short and strong: *skeleton* in the lower valve consisting of a semicircular loop, which is attached on each side by short and strong crura, and terminate in small pointed spurs: *inside* of both valves smooth and polished, exhibiting through the shell the thick outside ribs. L. 0·1, B. 0·1.

A single living specimen was dredged by Mr. Kent, in Mr. Marshall Hall’s yacht the ‘Norna,’ off the coast of Portugal, in about 500 fathoms. He very obligingly gave it to me with a specimen of the following species. It may perhaps be immature; but I cannot identify it with the young of any other species.

This pretty little shell differs from the young of *T. caput-serpentis* in shape, colour, having fewer ribs and a smooth interior, and in the loop being rounded instead of incurved at the base. In *T. caput-serpentis* of the same size as this (Pl. XXII. fig. 1) the inside, especially in front, has strong and conspicuous ridges, which become notches in the full-grown shell.

Typical. Loop short, semiannular.

4. TEREBRATULA SUBQUADRATA², Jeffreys. (Plate XXII. fig. 4.)

SHELL broadly triangular or oval, with a squarish outline; upper

¹ Triangular.

² Somewhat square.

valve gibbous; lower valve somewhat compressed; it is rather solid, opaque, and lustreless: *sculpture*, slight and fine longitudinal striæ, which radiate from the beak (50 to 60 in a larger, and half that number in a smaller specimen); these are crowded at the sides, and are occasionally or partially intervenient; concentric marks of growth distinct, besides numerous intermediate and irregular lines: *cereal tubuli* white, minute, and close-set: *colour* white, with an ochreous tinge: *margins* curved in front, or slightly indented there in the middle of the upper valve, more or less truncated at the sides, rounded and somewhat shouldered behind in the lower valve: *beak* extended or produced: *foramen* large, circular, complete, thickened, and reflected at the lower side: *deltidium* long and narrow, slightly grooved across: *hinge-plate* thick and broad: *teeth* in the upper valve short and incurved: *loop* narrow, keyhole-shaped, attached to the hinge by short crura, which terminate halfway in small blunt spurs, obtusely angular below in the smaller, and flexuous in the larger specimen: *inside* smooth, slightly grooved lengthwise in the smaller specimen, to correspond with the outside striæ, and having the inner edges of the larger specimen thickened and notched or crenate, as in *Astarte sulcata* and in many species of *Venus*, *Nucula*, and other genera. L. 1.05, B. 1 (larger specimen); L. 0.65, B. 0.55 (smaller specimen).

Hab. Off the coast of Portugal, in 500-600 fathoms (*Kent*).

Of this new and interesting species Mr. Kent dredged two specimens and a couple of valves, which he presented to Mr. Davidson and myself.

I at first thought it might be the *T. orbiculata* of Seguenza (Mem. Soc. Ital. Sc. Nat. t. i. no. 4, 1865, p. 7, tav. ii. f. 14-16), judging from the description and figures; but he has lately, with his usual courtesy, sent me for inspection the type of his species. This shows that the smaller valve is not shouldered (so as to give the shell a squarish outline), and that the striæ are much finer and more numerous than in *T. subquadrata*. He, indeed, now suspects that his species may be the young of a large species, such as *T. ampulla* or *T. grandis*; but that species is not striated lengthwise. I should be inclined to refer Seguenza's species to the variety *sphenoidea* of *T. vitrea*. The form of the skeleton or apophysis depends to some extent on the shape of the specimen in a species so variable as *T. vitrea*.

✓ 5. TEREBRATULA VITREA, Born. (Plate XXII. fig. 5.)

Anomia vitrea, Born, Test. Mus. Cæs. Vind. p. 104.

'Porcupine' Exp., 1870: Atlantic, St. 13, 220 f.; 16, 994 f.; 17a, 740 f.; 24, 292 f.; 25, 374 f.; off Cape Sagres, 45-58 f.; 26, 364 f.; 27, 322 f.; 28, 304 f.; 29, 227 f.; Mediterranean, 45, 207 f.; Capo de Gata, 40-69 f.; 55, 1456 f.; Adventure Bank, 92 f.

Atlantic coast of Spain to the Adriatic and Ægean: depths 5-310 f.

BODY clear white and gelatinous: *mantle* lining the valves, and

furnished at its edges with short and very delicate close-set cilia of different lengths and sizes, which project somewhat beyond the valves, as in *T. caput-serpentis*.

The tubercles which close the tubular perforations in the shell are extremely small and numerous. In some large and unusually thick valves dredged by Dr. Carpenter in H.M.S. 'Shearwater,' off the coast of Tunis, the perforations are irregular or unsymmetrical, as in *T. grandis*.

Var. 1. *minor*, Philippi, = *T. affinis*, Calcare.

'Porcupine' Exp., 1870: Mediterranean, St. 58, 266 f.

Off Jan Mayen's Isle, 263 f. (Friele, as *T. arctica*); Mediterranean, Adriatic, and Ægean, 30-310 f.; 'Challenger' Exp., off Cape of Good Hope, 150 f., and Azores, 1000 f.; 'Josephine' Exp., off Villa Franca, Azores, 320-600 f.; Japan, 55 f. (A. Adams, as *T. davidsoni*).

In a specimen of this variety from the Bay of Naples the front margin is cloven or deeply indented, apparently in consequence of the mantle having been injured in that part.

Var. 2. *sphenoidea*, Philippi. (Plate XXII. fig. 6.)

'Porcupine' Exp., 1870: Atlantic, St. 16, 994 f., 24, 292 f.; 25, 374 f.

Gulf of Florida, 100-270 f. (Pourtales, as *T. cubensis*).

After a protracted and very careful examination of my specimens, which I had considered the *T. sphenoidea* of Philippi, and having compared them with fossil specimens sent me by Professor Seguenza as Philippi's species from the Sicilian Tertiaries, as well as with a series of *T. cubensis* which I received from Count Pourtales and Professor Alexander Agassiz, and also after a close comparison of all these specimens with the description and figures given by Philippi, Seguenza, Pourtales, and Dall, I am convinced that *T. sphenoidea* and *T. cubensis* are the same, and constitute a well-marked variety of *T. vitrea*. The loop in *T. sphenoidea* and *T. cubensis* is precisely similar. The shape and proportions of the loop depend on the shape of the shell in *T. vitrea*, and, I believe, in every other species of *Terebratula*. Some recent and fossil specimens of this variety exhibit more or less distinct, although slight, longitudinal striæ, which radiate from the beak and are especially visible at the sides; and the same kind of sculpture is occasionally observable in specimens of the typical form of *T. vitrea*.

As to synonyms, I cannot recognize any valid character that would serve to distinguish Seguenza's Sicilian Tertiary species, *T. elliptica* and *T. michelottiana* from *T. vitrea*, or his *T. miocenica*, *T. orbiculata*, and *T. benoitiana* from the variety *sphenoidea*. *T. manticula* of Fischer (Journ. Conch. t. xvii. p. 81, pl. iii. fig. 4), a Miocene fossil of the south-west of France, seems to be closely allied to the variety *minor*, the only difference being that the deltidium in the fossil is larger. *T. cernica* of Crosse, from the Mauritius (Journ. Conch. t. xxi. p. 285, and xxii. p. 75, pl. i. fig. 3), may be also the present nearly ubiquitous species.

Costa, in his 'Fauna del Regno di Napoli,' refers the *T.*

sphenoïdea of Philippi to the variety *trigona* of his own *T. irregularis*, which is represented as having the skeleton of *T. septata* or some other septigerous species of the subgenus *Waldheimia*.

Subgenus II. *Waldheimia*. Loop long, reflected.

6. *TEREBRATULA TENERA*, Jeffreys. (Plate XXII. fig. 7.)

T. tenera, Jeffr. in Ann. & Mag. N. H., Sept. 1876, p. 250.

'Valorous' Exp. 1450 f.

✓ 7. *TEREBRATULA CRANIUM*, Müller.

T. cranium, Müll. Zool. Dan. Prodr. p. 249, no. 3006: Br. Conch. ii. p. 11; v. p. 163, pl. xix. fig. 1, 1a.

'Lightning' Exp.: St. 2, 170 f.; 4, 530 f.; 5, 189 f.; 7, 650 f.; off the Faroes, 164 and 208 f.

'Porcupine' Exp., 1869: St. 14, 173 f.; 15, 422 f.; 23a, 420 f.; 25, 164 f.; 46, 374 f.; 50, 355 f.; 57, 632 f.; 61, 114 f.; 65, 345 f.; 74, 203 f.; 75, 250 f.; 78, 290 f.; 83, 262 f.; 84, 155 f.; 85, 190 f. 1870: St. 1, 567 f.; 2, 305 f.; 3, 690 f. (and var. *oblonga*); Vigo Bay, 30 f.; 24, 292 f.

Greenland (Wallich, Möbius), and Norway (Müller and others), to the south-west of France (De Folin, Fischer), Vigo (McAndrew): 5-650 f. St. Margaret's Bay, Nova Scotia (Willis)? Northern Asia and Japan (A. Adams).

The tubercles or cæcal extremities of the canals which permeate the shell are more numerous in this than in the next species (*T. septata*), and are arranged in wavy lines. The gradual development of the skeleton or apophysary process in both species is very remarkable, and has been admirably shown by Herr Friele of Bergen in a series of figures which accompany his papers on the subject in the 'Vidensk. Selsk. Forh.' for 1875, pl. i. fig. 9, a-i, and 'Archiv for Mathematik og Naturvidenskab' for 1877, tab. i.-iii. Mr. Charles Moore had also, in 'the Geologist' for 1860, described and illustrated certain modifications in the loop of a fossil species, *Terebratella buckmanni*, which are not less important in respect of the classification of the Brachiopoda. The skeleton of a young *Megerlia truncata*, and probably of every other jointed Brachiopod, is different from that of an adult specimen.

In the second volume of my work on British Conchology, p. 14, I stated that the lower valve in the young of *T. cranium* is "furnished with a very distinct and prominent crest or ridge, placed inside and nearly in the middle of this valve," and that the same character "likewise occurs in *T. septata*, Philippi, a Sicilian fossil (*T. septigera*, Lovén), and is remarkably developed in that species; but the foramen is incomplete in *T. cranium*, and entire in *T. septata*." I now find, on further examination of my Shetland specimens, that some of those which I had taken to be the young of *T. cranium* really belong to *T. septata*; and consequently the latter species is an inhabitant of our own coasts as well as of the Norwegian

and other seas. The septum in the very young of *T. cranium* consists of a mere upright point, as in *Megerlia*; and the loop is then round and small, becoming elliptical and extended in the adult. The foramen is incomplete in the young of *T. septata*, and resembles that of *T. cranium* in every state; and this is likewise the case as to the young of *T. vitrea*.

Mr. Dall, in the 'American Naturalist' for March 1871 (vol. v. p. 55), indicated a new genus of Brachiopods, founded on some young specimens of *T. cranium* which I had sent him from the 'Porcupine' dredgings in 1869. He said the loop "has no secondary attachment to the hæmal valve, and the latter is destitute of a septum." This genus he proposed to name *Frenula*, and the species *jeffreysii*. In the American Journal of Conchology for 1871 (vol. vii. pt. 2, p. 65, pl. ii. figs. 7-10) he gave a more detailed account, with figures, of the same species as *Ismenia? jeffreysi*. His figures agree with those published by Herr Friele to illustrate the development of the skeleton in *T. cranium*. Mr. Dall remarks as to his species, "Without a septum in either valve. Loop unattached except by the hæmal processes to the hinge plate," and further on, "None of the specimens had the slightest trace of a septum." He then alludes to having subsequently received from me other young Brachiopods, of which he says, "All of them possessed a filiform but rather stout septum;" and, although with some doubt, he was of opinion that all the specimens belonged to the same species, and that in those first mentioned "the septum must have been broken away." He has since, at my request, kindly sent me for my inspection a specimen of his species, which he now calls *Megerlia jeffreysi*, and which he says he received from me as the young of *T. cranium*; and he has presented me with some valves dredged by him at Port Etches in Alaska, at a depth of about 15 fathoms, and which according to him were "probably" the same species, although he carefully explained that he would not vouch for it. The valves in question were worn and apparently old, but all of them showed the septum most distinctly; and they may belong to the species which Mr. Dall has very lately described anew as *Megerlia jeffreysi*. These valves are not unlike *Terebratella* (?) *frontalis* of Middendorff in shape and texture; but they differ essentially in the position of the septum as well as in the deltidium. In Mr. Dall's imperfect specimens the septum resembles that of *Terebratella spitzbergensis*, viz. in being a long narrow and thread-like lamina extending from the middle of the deltidium for about two thirds of the inside towards the front; in *T. frontalis* (judging from the type most obligingly sent me by Dr. v. Schrenck from the St. Petersburg Museum for my inspection) the septum is that of *Argiope*, being gnomon-shaped or triangular, and placed near the front. The apophysis of *Megerlia truncata* does not correspond with that of any of the above-named species. I would here remark that the septum is not at all likely to be broken away and entirely disappear, because it is formed in the protected part of the lower valve. It is persistent in the most worn and even fragmentary spec-

cimens of *T. septata*, *Terebratella spitzbergensis*, and *T. (?) frontalis*, and of other similarly furnished Brachiopods. Mr. Dall has now redescribed *Megerlia jeffreysi* in his 'Scientific Results of the Exploration of Alaska' (June 1877, p. 48), and says as to the apophysis "*Megerlie sanguinea* simillima," the habitat being thus given, "N. E. Atlantic, 155-345 fathoms, Jeffreys, with *Waldheimia cranium*. Semidi Islands, Port Etches, Dall; Victoria, V. Id, J. Richardson." Mr. Davidson tells me that Herr Friele was mistaken in saying that the former considered *M. jeffreysi* the young of *Megerlia sanguinea*.

Now I fear there must have been some mistake about the Atlantic and Pacific specimens. I have no doubt that the shell described last year by Mr. Dall as *Megerlia jeffreysi* (see Plate XXIII. fig. 3), and which by his permission I have examined, is a perfectly good species of *Megerlia*, having a distinct septum and the loop three times attached; and I thank him sincerely for the compliment he has paid me in associating my name with it. But at the same time I firmly believe that the specimens described by him in 1871 as *Frenula jeffreysii* and *Ismenia? jeffreysi* belong to a different species and another genus, and that such last-mentioned species was *T. cranium*. The other specimens which I afterwards sent him, and which had a "rather stout septum," may have been the young of *T. septata*.

Synonyms: *Anomia terebratula*, L.; *Terebratula plicata*, Philippson; *T. euthyra*, Philippi; *T. subvitrea* and *T. glabra*, Leach; and perhaps, in the younger state, *Waldheimia davidsoniana* of Seguenza.

Mr. Davidson in 1853 and 1855 placed *Waldheimia* as a sub-genus of *Terebratula*; but in 1861 he raised it to generic rank.

8. *TEREBRATULA SEPTATA*, Philippi. (Plate XXIII. figs. 1, 1 a, b, c; loop.)

T. septata, Ph. Moll. Sic. ii. p. 68, t. xviii. fig. 7 (1844).

'Porcupine' Exp., 1869: St. 23a, 420 f.; 36, 725 f.; 39, 557 f.; 54, 363 f.; 65, 345 f.; 67, 64 f.; 68, 75 f.; 74, 203 f.; 75, 250 f. 1870: 1, 567 f.; 3, 690 f.; 6, 358 f.; 9, 539 f. A perfect cast or petrification of apparently this species was also dredged by me, with other Tertiary fossils, at Station 24, 292 f., off the Atlantic coast of Spain.

Norway, 100-300 f. (Lovén and others); Shetland, 80-90 f., young, with *T. cranium* (J. G. J.).

A Japanese Brachiopod, *Terebratella marice* of A. Adams, may be a dwarf variety of the present species, corresponding with the variety *minor* of *T. vitrea*. *Waldheimia raphaëlis* of Dall, also from the North Pacific, looks like a gigantic variety of *T. septata*, the author having kindly permitted myself and Mr. Davidson to compare his specimen of *W. raphaëlis* with some of *T. septata*, my largest specimen of which measures an inch and three tenths in length.

I cannot detect any distinctive character of importance in *Waldheimia floridana* of Pourtales, from the Gulf of Florida, 100-200 fathoms, to separate it specifically from *T. septata*. He says (Bull.

Mus. Comp. Zool. No. 7, 1869, p. 127), "Very young specimens are flatter, rounded, and have a strait margin; they could scarcely be distinguished from the young of *Terebratula cubensis*, if it was not for the loop and septum seen by transparency. There is also some variety of form in the old; in some specimens the length is greater than the breadth, and there is considerable diversity in the sinuosity of the frontal margin." *T. septata* is not less variable in shape and in the flexuosity of the front margin; a young specimen which I dredged in the 'Porcupine' Expedition of 1870, attached to a branch of *Oculina prolifera*, was mistaken by me for *Terebratella spitzbergensis*, having the same oval and laterally compressed outline, and a similar septum visible through the shell.

In young and half-grown specimens of *T. septata*, as well as in other allied species, the side flanges or flaps of the loop are closed by a membrane, which is removable; the openings then appear. The inner layer of the shell is microscopically and closely striated lengthwise. The gradual development of the skeleton or apophysary process, indicated by the changes which take place in the course of growth, is very remarkable, and is shown in the accompanying figures (Plate XXIII. figs. 1 a, b, c). Mr. Davidson and I agree that the loop in *T. septata*, when quite young, resembles that of a *Megerlia*, and is three times attached; at a rather more advanced age it assumes the form of a *Terebratella*, and is twice attached; in the full-grown state it has all the characteristics of the subgenus *Waldheimia*, and is attached only to the hinge-plate. Mr. Friele has also, to some extent, demonstrated these retrograde changes in his papers above referred to.

This species is unquestionably the *T. septigera* of Lovén (1846), and equally without doubt (so far as my opinion is worth any thing in either case) the *T. septata* of Philippi, 1844. Seguenza, however, considers Philippi's species to belong to the genus *Terebratella*; and he has named Lovén's species *Waldheimia peloritana*. Although the skeleton represented in Philippi's figure was imperfect, there is no appearance of the cross bar to which the loop is attached in *Terebratella*, and which cross bar is not less persistent than the septum in broken and worn specimens of so many species of that genus as well as of *Megerlia*. Indeed his description and figures agree as closely with imperfect specimens of *T. septigera*, as those of his *T. euthyra* with imperfect specimens of *T. cranium*. Seguenza may have found in the Sicilian Tertiaries not only his *W. peloritana*, which he now refers to *T. septigera*, but also a species of *Terebratella* which he regards as Philippi's species. For this last-mentioned species, if not known in a recent or living state, he might give another name. Were not priority of publication an essential standpoint for scientific nomenclature, *septigera* might be retained for the recent species, and *septata* for Seguenza's fossil species of *Terebratella*; but in the absence of better data it may be more advisable "quieta non moveri." *W. peloritana* and *W. floridana* appear to be the same variety of *T. septata*.

I cannot refrain from expressing my admiration of the careful and

valuable work of Professor Seguenza, notwithstanding that my notions of the distinctive character of certain species do not accord with his.

Genus II. TEREBRATELLA.

TEREBRATELLA SPITZBERGENSIS, Davidson. (Plate XXIII. fig. 2; loop.)

Terebratella spitzbergensis, Dav. in Ann. & Mag. N.H. 1855, xvi. p. 442, pl. x. fig. 3; B. C. ii. p. 2; v. p. 164, pl. xcix. fig. 3.

Spitzbergen, Iceland; 'Valorous' Expedition, Wellington Channel, Davis Strait, Gulf of St. Lawrence, North Japan, and Shetland: depths 20-690 fathoms.

Genus III. ARGIOPE.

Typical. Having three septa.

✓ 1. ARGIOPE DECOLLATA, Chemnitz.

Anomia decollata, Ch. Conch. Cab. viii. p. 96, pl. 78. figs. 705 a-d.

Argiope decollata, B. C. ii. p. 18; v. p. 164, pl. xix. fig. 3.

'Porcupine' Exp., 1870: Atlantic, St. 24, 292 f.; 36, 364 f. Mediterranean, 58, 50 f.; Adventure Bank, 92 f.

Guernsey, South-west of France, Atlantic coasts of Spain, Mediterranean, Adriatic, Ægean, Madeira, Canary Isles: 18-130 f.

In some specimens, recent and fossil, the ribs are evanescent or scarcely perceptible. Size variable.

Synonyms: *Anomia detruncata*, Gmelin; *Terebratula aperta*, De Blainville; *T. cardita* and *T. urna-antiqua*, Risso; *T. ungula*, Retz; *T. pectiniformis*, O. G. Costa; *T. dimidiata*, Scacchi.

Subgenus *Cistella*. With a single septum.

2. ARGIOPE NEAPOLITANA, Scacchi.

Terebratula neapolitana, Sc. Oss. Zool. 1833, ii. p. 18.

Mediterranean, Adriatic, Ægean, and Canary Isles: 30-320 f.

The number of ribs varies from two to eight, some specimens being quite ribless; and the shape and size are also very variable characters, as in *A. cuneata*. From that species *A. neapolitana* may be distinguished by the inner margin in the latter being furnished with a numerous row of small and short ridges, which become tubercular in front, by the anterior margin being indented in the middle, and by the septum in the lower valve being notched across. In some specimens, which are more transparent than usual, the marginal ridges can be seen outside.

Philippi has, in the figures given in his first volume, evidently confounded the present species (his *Terebratula seminulum*) with *Platydia anomioïdes*, which it seems he did not then know.

Terebratula cordata, Risso; *T. seminulum*, Ph.; *Orthis bifida*, Costa; *A. forbesi*, Davidson.

3. ARGIOPE CISTELLULA, S. V. Wood.

Terebratula cistellula, S. V. Wood, in Ann. & Mag. N. H. vi. p. 253.

A. cistellula, B. C. ii. p. 19, pl. 1. f. 2; v. p. 164, pl. xix. f. 4.

Norway, Shetland to Guernsey, Ireland, Normandy, S.W. France: 20–45 f.

I was wrong in referring this species to the *Orthis lunifera* of Philippi, which is (at any rate partly) the young of *Megerlia truncata*. I likewise mistrust the Mediterranean habitat cited by me for a specimen of the present species, and have now omitted it; the specimen was more probably the young of *A. cuneata*.

4. ARGIOPE CUNEATA, Risso.

Terebratula cuneata, Risso, Hist. Nat. de l'Eur. mérid. iv. p. 388, fig. 179.

Mediterranean, Adriatic, Ægean, and Canary Isles: 28–200 f. Probably also Guadeloupe, 111–150 f. (Schramm, fide Crosse and Fischer as *A. schrammi*).

The shape varies from triangular to broadly oblong; ribs two to ten, more or less vanishing in some specimens, and altogether wanting in others.

I have been favoured by Professor Seguenza with an opportunity of examining his unique specimen of *A. biplicata* from the Straits of Messina, and of comparing it with an extensive series of *A. cuneata* and its colourless variety. The result of such examination and comparison, as regards both the outside and inside, compels me to consider the specimen an abnormal form of *A. cuneata*.

Terebratula soldaniana, Risso; *Anomia pera*, v. Mühlfeld; *T. scobinata*, Cantraine, not *Anomia scobinata* of Linné.

Subgenus *Gwynia*. No septum.

5. ARGIOPE CAPSULA, Jeffreys.

Terebratula capsula, Jeffr. in Ann. & Mag. N. H. ser. 3, ii. p. 125, pl. v. f. 4; iii. pl. ii. f. 7, 8.

A. capsula, B. C. ii. p. 21; v. p. 164, pl. xix. f. 5.

East and south of Ireland, Plymouth, Weymouth, Guernsey, Etretat; Sluys-kill, Zealand, near the Belgian frontier (Colbeau)? : 8–25 f.

I have lately opened and carefully examined more specimens of this minute Brachiopod, as well as very young specimens of *Terebratula caput-serpentis*, *T. cranium*, *T. vitrea*, *Argiope decollata*, *A. neapolitana*, *A. cistellula*, *A. cuneata*, *Platydia anomioïdes*, and *Megerlia truncata*, of nearly similar dimensions. All of these last are certainly distinct from *A. capsula* in respect of the internal apparatus or skeleton, which is nearly wanting in *A. capsula*. The young of *Platydia anomioïdes* has, besides the septum, a very large byssal orifice in the lower valve; otherwise that species might be the adult of *A. capsula*; but it has never been found with the latter species,

nor even in the same parts of the ocean. It is clearly unscientific to suppose that, because *A. capsula* is tiny, it cannot be a good species, in whatever genus it ought to be placed. Until there is some proof or fair presumption that it is embryonic or immature, it would be preferable to retain it in the subgenus of *Argiope*, for which Dr. King proposed the generic name *Gwynia*.

Genus IV. PLATYDIA.

✓ PLATYDIA ANOMIOIDES, Scacchi and Philippi.

Orthis anomioides, Sc. & Ph., Moll. Sic. ii. p. 69, t. xviii. f. 9.

'Porcupine' Exp., 1869. : St. 78, 290 f. One of my specimens is twice the length of any I have seen from the Mediterranean; the other is minute, of an oval shape, and apparently abnormal.

Coast of Portugal, 600 f. (Kent)!; Mediterranean and Ægean, 40–120 f.; Gulf of Florida, 237 f. (Dall); 'Challenger' Exp., "attached to a specimen of *Waldheimia kerguelensis*," St. 145, lat. 46° 40' S., long. 37° 50' E., off Prince-Edward Isles, 150 f. (Davidson)!

One of my Tunisian specimens is acutely triangular. The lower valve is sometimes more convex than the upper, as in *Anomia ephippium*, owing to the habit this Brachiopod has of attaching and moulding itself by the under surface to corals and other irregular substances.

This is the *Terebratula appressa* of Forbes, who published it in the same year as Philippi. Mr. Dall referred to this species the *Orthis eusticta* of Philippi; but that is a species of *Megerlia*, and very different from this. According to Professor Seguenza the young of *P. anomioides* is the *Terebratula seminulum* of Philippi.

Mr. Davidson proposed the genus *Morrisia* for the present species; but, with true scientific candour, he gave it up in favour of *Platydia*, which had been described by O. G. Costa a few months previously in the same year. In the 'Annals' for December 1855, he apparently considered *Morrisia* and *Megerlia* subgenera of *Terebratella*; and in July 1861 he queried *Morrisia* as a distinct genus. However, his present scheme of classification is much more satisfactory; and I will not presume to criticise it.

Genus V. MEGERLIA, (*Megerlea*) King.

✓ MEGERLIA TRUNCATA, Linné.

Anomia truncata, L. S. N. p. 1152.

M. truncata, B. C. ii. p. 22; v. p. 164.

'Porcupine' Exp., 1870: Atlantic, St. 24, 292 f. (and var. *monstruosa*); 36, 128 f. Mediterranean, 45, 207 f. (and var.), Capo de Gata, 40–69 f.; 58, 266 f. (and var.); Adventure Bank, 92 f. (and var.).

Atlantic coasts of France and Spain, Mediterranean, Adriatic, and Ægean: 10–120 f. Cape of Good Hope, 224 f. (and var.). Canary Isles, 60 f. 'Challenger' Exp., off Teneriffe, 70–75 f. Isle of Bourbon, 200 f. (Deshayes, as *Morrisia gigantea*). Australia (Angas,

fide Dall). The habitat given by Linné, "in pelago Norvegico," is erroneous, so far as we at present know or believe, as well as "Torquay" on Dr. Turton's authority.

Very common and not less variable. Some specimens, especially the young, are more or less acutely triangular; others are nearly ribless or smooth; the very young have merely a moderately large byssal orifice in the lower valve, the beak of the upper valve being pointed; and the loop is annular as in the subgenus *Terebratulina*. This is a case of progressive development, and the reverse of what takes place in *Terebratula septata*. The skeleton is distorted in the monstrous form or variety. The size given by Deshayes for his *Morrisia gigantea* scarcely exceeds one half of some 'Porcupine' specimens from 266 fathoms.

There are six other synonyms, but obsolete. *Terebratula* (afterwards *Orthis*) *lunifera* of Philippi, Forbes, and Costa is the young; the skeleton being imperfect or broken causes the appearance denoted by that specific name. Mr. G. B. Sowerby, jun., figured in his 'Thesaurus' a ribless variety of *Argiope cuneata* as Philippi's species. The distorted variety, which Scacchi at first described as *Terebratula monstrosa*, but subsequently called "Antecedentis varietas" with reference to the present species, is the *Morrisia davidsoni* of Eudes Deslongchamps; it not unfrequently occurs with the normal and intermediate forms.

Seguenza in 1865 classified "*Megerlea*" as a subgenus of *Terebratella*.

Genus VI. THECIDEA.

THECIDEA MEDITERRANEA, Risso.

T. mediterranea, Risso, Hist. Nat. de l'Eur. mérid. iv. p. 394, f. 185.

Mediterranean, especially the African coasts, 30–300 f. Jamaica, 60 and 150 f. (Barrett, fide Davidson). Mauritius (Sir Henry Barkly)!

Thecidea spondylea of Scacchi, and probably *T. testudinaria* of Michelotti.

B. Imperforate.

Family II. RHYNCHONELLIDÆ.

Genus I. ATRETIA.

ATRETIA GNOMON, Jeffreys. (Plate XXIII. fig. 4.)

A. gnomon, Jeffr. Proc. R. S. no. 121, 18th Nov. 1869, p. 121; Ann. & Mag. N. H. Sept. 1876, p. 251.

'Porcupine' Exp., 1869: St. 20, 1443 f.; 30, 1380 f.

'Valorous' Exp.: Davis Strait, 1100–1750 f.; North Atlantic, 1450 f. Norwegian Arctic Exp., 1877: about thirty miles west of "Tromsö," on the slope of the banks, "cold area," 650 f. (Friele)!

According to Mr. Dall, *Atretia* is a synonym of Zittel's genus *Dimerella* (Dunker and v. Meyer, Palæont. 1870, p. 220), which is a Jurassic Brachiopod; but, although it belongs to the same family,

the internal apparatus is different, and the beak is prominent in *Atretia* and incurved in *Dimerella*. The septum in *Atretia* is short, gnomon-shaped, and central; in *Dimerella* it extends from below the beak to the front of the lower or smaller valve. The genus *Mannia* of Dewalque (Soc. Malac. Belg., 1874), from the "sable noir," or Upper Miocene of the Antwerp Crag, is also a Rhynchonellidan; but the internal apparatus is likewise different from that of *Atretia*.

Each of the curved processes in the lower or smaller valve of *Atretia* *gnomon* has the outer end trifold, or is divided into three symmetrical digitate points.

Genus II. RHYNCHONELLA.

1. RHYNCHONELLA PSITTACEA (ROSTRUM-PSITTACI), Chemn.

Anomia rostrum-psittaci, Ch., viii. p. 106, tab. 78. f. 4 *a*, *b*, *c*.

R. psittacea, B. C. ii. pp. 22, 23; v. p. 164, pl. xcix. f. 4.

Arctic and northern seas in both hemispheres, from Spitzbergen to Drontheim, and from Franklin-Pierce Bay in 79° 25' N. lat. to Maine, U. S., in the North Atlantic; and from Behring Strait to Japan in the North Pacific: 10–690 f. Australia, with *R. nigricans* (J. W. Flower)! Shetland, 90–100 f.; apparently recent, but possibly relics of the "glacial era" (J. G. J.). North Sea, S.E. of Yarmouth (Metzger); possibly also semifossil. Several spurious or more than doubtful habitats on the Scotch and English coasts have been recorded.

✓ 2. RHYNCHONELLA SICULA¹, Seguenza, MS. (Plate XXIII. figs. 5, 6.)

BODY whitish, gelatinous: *mantle* not furnished at its edge with setæ or bristles, as is the case in the Terebratulidæ: *arms* fringed with short cirri, which are unequal in length and curl inwards at their extremities: *byssal plug* small, cylindrical, and slender; its outer case or sheath is chitinous, and resists the action of liquor potassæ.

SHELL ovately triangular, having the upper valve convex and the lower valve somewhat compressed, rather thin, semitransparent, and glossy: *sculpture*, numerous and close-set, minute, very fine and regular longitudinal striæ; lines of growth slight but distinct: *colour* pale brownish-yellow: *margins* nearly straight in front (instead of being flexuous as in *R. psittacea*), irregularly sloping at the sides, broadly angular behind: *beak* very short, incurved: *foramen* very small, oval, incomplete: *deltidium* broad, slightly concave: *hinge-plate* narrow: *teeth* in the upper valve triangular and long; the processes in the lower valve approximate at the base, forming an inverted V, and are irregularly oblong, rather thin, and concave in the middle; each of these processes extends outwards as a thin and narrow lamina, which curves upwards, and is divided at its outer end in a pectinate or comb-like manner, as in *Atretia* *gnomon*, but has more digitations or points; the sockets of the teeth are grooved transversely: *septum* ridge-like, short, placed in the centre of the

¹ Sicilian.

large muscular scar below the beak : *inside* smooth and glossy, not contracted behind, nor grooved like *R. psittacea*. L. 0·9, B. 0·75.

'Porcupine' Exp., 1870; St. 3, 690 f.: Chops of the English Channel. One perfect and living specimen, besides two not quite perfect valves and some fragments.

The shape of the Sicilian fossil, for a specimen of which (see Plate XXIII. fig. 6) I am indebted to Professor Seguenza, is rather more broadly triangular, and is uniformly convex; but it agrees with the recent specimen above described in its peculiar sculpture, want of flexuosity in the front margin, short beak, and small foramen. The fibrous texture of the shell is much softer and looser than that of *R. psittacea*¹. Attached to the living specimen of *R. sicula* is a remarkable species of *Balanus* or an allied genus, which will be elsewhere noticed.

** *Hingeless.*

Family I. CRANIIDÆ.

Genus CRANIA.

CRANIA ANOMALA, Müller.

Patella anomala, Müll. Zool. Dan. Prodr. p. 237.

C. anomala, B. C. ii. p. 24, pl. i. f. 3; v. p. 165, pl. xix. f. 6.

'Lightning' Exp., St. 2, 170 f.; 4, 530 f.; 5, 189 f. (var. *alba*).

'Porcupine' Exp., 1869, St. 2, 808 f.; 6, 90 f.; 7, 159 f.; 12, 670 f.; 14, 173 f., on *Oculina prolifera*; The Minch, 170 f.; 74 & 75, 203–250 f.; 78, 290 f., with *Platydia anomioides*. 1870, Atlantic, 1, 567 f.; 3, 690 f., upper valve coloured with reddish-brown streaks; 24, 292 f.: Mediterranean, 45, 207 f.; 58, 266 f.; Adventure Bank, 92 f.

Spitzbergen to the Mediterranean, Adriatic, and Ægean: 3–255 f. Jamaica (Barrett, as *C. personata*, in coll. M'Andrew); North Sea, 0–106 f. (Metzger).

Some of the specimens procured by Dr. Carpenter in H.M.S. 'Shearwater' off the coast of Tunis, in from 40 to 120 fathoms, are unusually thick, especially at their edges, which are closely notched inside; and they belong to the variety which Seguenza has described and figured as *C. lamellosa* from the Sicilian Pliocene beds. In two or three of these 'Shearwater' specimens the hinder margin of the upper valve is nearly straight; and the posterior muscular scars project somewhat beyond the sides, so as to give a hinge-like character to that part of the valve. The interior of the upper valve in one specimen is covered with crowded oblong tubercles, which are arranged in the line of growth. The inside margin of the lower valve is generally more or less raised, as I pointed out in 'British Conchology,' vol. ii. p. 25.

There are several synonyms, viz.:—*Criopus fimbriatus* for the animal or soft parts of this and other Brachiopods, and *Anomia*

¹ In *R. psittacea* the curved processes in the lower valve are rather long, irregularly triangular and twisted; the lamina is furnished underneath with five or six slight obliquely transverse ridges, which form notches at the inside edge.

turbinata for the shell of the present species (Poli); *Patella distorta* (Montagu); *Orbicula norvegica* (Lamarck); *C. ringens* and *C. rostrata* (Hœninghaus); *Discina ostreoides* (Turton); *Criopus orcadensis* (Leach), and *Crania personata* (Sowerby and others, not Lamarck); var. *alba* = *C. suessia* (Reeve, in coll. M'Andrew)!

Mr. Dall was quite right in ascribing the original authorship of the generic name *crania* to Retz, instead of to Philippon, as I had erroneously stated. See Schrift. Berlin. Ges. naturf. Fr. Bd. ii. p. 72, tab. i. f. 2-7, 1781. Philippon published the same name in 1788.

Family II. DISCINIDÆ.

Genus DISCINA.

✓ DISCINA ATLANTICA, King. (Plate XXIII. fig. 7.)

D. atlantica, King in Proc. N. H. Soc. Dublin, 1868, vol. v. p. 170: Jeffr. in Ann. & Mag. N. H., Sept. 1876, p. 202.

'Porcupine' Exp., 1869, St. 19 a, 1366 f.

Off the west coast of Ireland, 1240 f. (Capt. Hoskyns). North Atlantic, while fishing up the deep-sea telegraph cable in about 2400 f. (Sir James Anderson), 'Valorous' Exp., 1450 & 690 f. (J. G. J.). 'Challenger' Exp., near St. Paul, 1850 f.; N. Pacific, 1875 f. & 2050 f.; off Bermuda, 2180 f. (Davidson)!

I have also to thank Mr. Davidson for telling me of a mistake in my short description of the animal in the 'Annals' above cited; and I gladly take this opportunity of correcting it. The word *mantle* ought to be substituted for "*arms*."

D. atlantica is probably the same species as the Coralline-Crag fossil which Mr. S. Wood at first doubtfully named *D. norvegica* and afterwards *D. fallens*, and which Mr. Davidson at first doubtfully named *Orbicula lamellosa* and afterwards *D. fallens*. But *O. norvegica* of Sowerby (= *O. lamellosa*, Broderip) is a very different and tropical species of *Discina*.

The genus *Discina* appears to be the connecting link, at least analogically, between the Brachiopoda and Conchifera through *Anomia*, both having a similar plug of attachment in the lower valve.

EXPLANATION OF THE PLATES.

PLATE XXII.

Fig. 1. *Terebratulula caput-serpentis*, young; to show the loop: p. 401.

2. *T. tuberata*, p. 401.

3. *T. trigona*, p. 402.

4. *T. subquadrata*, p. 402.

5. *T. vitrea*; loop: p. 403.

6. *T. vitrea*, var. *sphenoïdea*; loop: p. 404.

7. *T. tenera*, p. 405.

PLATE XXIII.

1. *Terebratulula septata*, p. 407.

2. *Terebratella spitzbergensis*; loop: p. 409.

3. *Megerlia jeffreysi*; loop: p. 407.

4. *Atrertia gnomon*, p. 412.

Fig. 5. *Rhynchonella sicula* (recent), p. 413.

6. *R. sicula* (fossil), p. 414.

7. *Discina atlantica*, p. 415.

Observation.—In the enlarged figure of *Terebratula vitrea*, var. *sphenoidea*, the striæ are much too strongly marked. In the figure of *Discina atlantica* the setæ are represented too thick.

2. On the Male Generative Organs of *Hyæna crocuta*. By M. WATSON, M.D., Professor of Anatomy, Owens College, Manchester.

[Received April 5, 1878.]

(Plates XXIV. & XXV.)

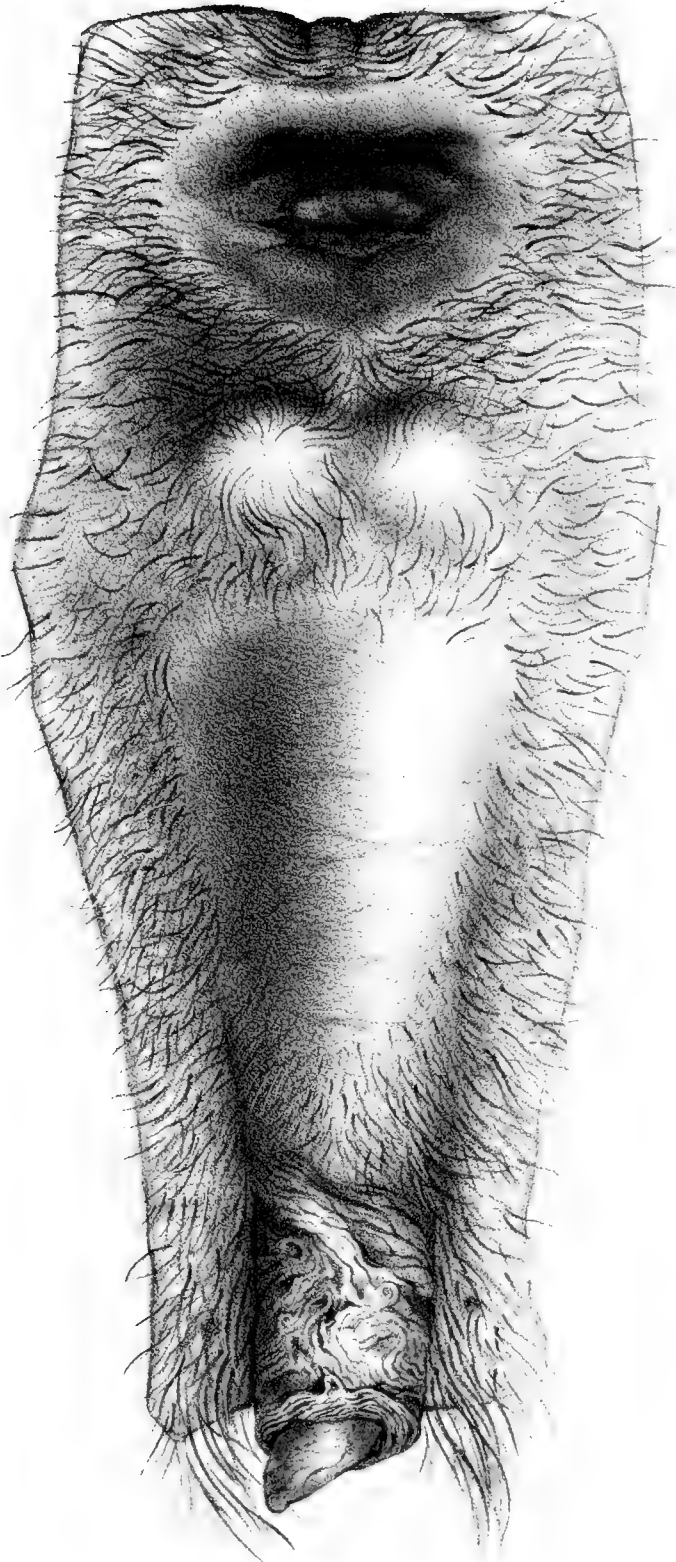
In a previous communication¹ I laid before this Society a description of the female organs of *Hyæna crocuta*, and having lately had an opportunity of examining those of an adult male of the same species, have thought that a description of these would not be altogether uninteresting, more especially as, so far as I can ascertain, no complete account of them has hitherto been published. For the sake of comparison I shall follow the plan pursued in the paper referred to, describing in the first place the external, and secondly the internal organs of generation.

External Parts.

The anal and perineal regions of the male resemble so closely those of the female that without a very accurate examination it is impossible to distinguish between the sexes. In both there is a well-marked glandular pouch above the anus; in both there are cutaneous elevations corresponding in appearance to that of the scrotum in the males of allied species; and in both there is an elongated, pendulous, penis-like body, surrounded by a prepuce, and perforated at its extremity by a single aperture of small size.

Penis.—This organ is directed forwards, and lies along the middle line of the perineum as in the dog. The free portion, consisting of a central glans surrounded by a thick fleshy prepuce, projects forward and downward from the level of the abdominal wall, and measures one inch and a half in length. The glans is conical in form and without distinct corona, the urethral aperture being situated on the apex of the cone. The inferior lip of this aperture is prolonged forward to some extent, so that seen from the side the glans presents the appearance of being obliquely truncated from before backward and upward as in the female, although the truncation is not so well marked as in that sex. In the flaccid condition of the organ the glans is for the most part concealed by the prepuce, its apex only being exposed. The latter portion is of a dark blue colour, and its surface is much corrugated, whilst so much of the glans as is concealed by the prepuce is of a purplish colour and presents no trace of corrugation. Its basal two thirds are moreover covered by small

¹ Proc. Zool. Soc. May, 1877.



Young M.B. del JSmit lith

Hanhart imp

ANATOMY OF HYENA CROCUTA





GP

Pr

P

B

Fig 2

C.P

RF

BU

AG





recurved spines, which diminish in size toward the margin of the prepuce and are altogether absent on its free corrugated portion. The urethral aperture is smaller and less dilatable than the corresponding opening in the female. The prepuce, consisting of a thick double fold of integument of a bluish colour externally and flesh-coloured internally, is thrown into well-marked circular rugæ and is attached by a distinct frænum to the under surface of the base of the glans. When retracted it is continuous with the surface of the latter. In the female the frænum is attached, not to the *base* of the glans, but to the inferior lip of the urino-genital canal.

Perineum.—The perineum, from the inferior border of the scrotum to the base of the free portion of the penis, measures 4 inches in length, a measurement which agrees exactly with that of the corresponding region of the female. The integument, like that of the prepuce is of a bluish colour, smooth, and devoid of hair with the exception of a space immediately behind the free portion of the penis, which space is covered with down of a light yellowish colour, the hairs being directed forwards. It is worthy of note that this area in the male corresponds exactly with that which in the female is studded with the little depressions described in my paper on the genital organs of that sex. And here I would take the opportunity of correcting an error into which I unwittingly fell in that paper. I refer to the statement contained therein that the integument of the female perineum is thrown into longitudinal rugæ. These, as the accompanying drawing shows, are altogether absent in the male in the recent state of the parts, and only manifest themselves subsequent to their immersion in alcohol. As the female organs had been subjected to this treatment previous to their examination, I have little doubt that in their natural condition these parts present the uniformly smooth appearance I have just described in the male animal. The presence of these folds in the female, moreover, induced me to hazard the conjecture that they *might* represent in *H. crocuta* the labia of other carnivora. This supposition is now no longer tenable, as the examination of the male perineum has led me to conclude that the homologues of the labia are not to be sought in the longitudinal perineal folds just referred to, but rather in the cutaneous elevations described in my former paper under the name of "scrotal pouches."

Scrotum.—The scrotum is non-pendulous, and resembles that of the Felidæ proper. It is situated one inch below the margin of the anus; and its division into two is indicated externally by a shallow groove. Each half is about the size of a small walnut; and the surface of each is covered with hair of a light brown colour. It is interesting to observe that this description corresponds almost exactly with that of the so-called "scrotal pouches" of the other sex, the only difference being that in the male the scrotum is slightly more prominent than the "scrotal pouches" of the female.

Anus and Anal-gland Pouch.—The anus is situated one inch above the scrotum; and between the former and the root of the tail is a pouch similar to that which is found in the female. The interior of the pouch is smooth and devoid of hair, except the roof, which is

clothed with down of a lightish colour. The down at the external angles of the pouch is longer than elsewhere, and forms two tufts which project into the pouch. Opening into the bottom of each extremity of this pouch is the duct of an anal gland; whilst extending between these larger apertures is a belt of small perforations, which indicate the ducts of a number of small isolated follicles lying in relation to the fundus of the pouch.

Nipple.—Upon either side of the middle line, and half an inch external to the free portion of the penis, is a single rudimentary nipple. It measures one eighth of an inch in height, and lies concealed in the thick hair of this region.

Internal Organs.

Rectum and Anal Glands.—The rectum occupies the usual position in the pelvis, and is provided with walls of unusual thickness, the external or longitudinal muscular bundles being particularly well developed. It is attached to the lower surface of the sacrum by a double fold of peritoneum or meso-rectum, which measures between two and three inches in breadth, and consequently allows of considerable movement of the rectum within the cavity of the pelvis. The terminal portion of the rectum is surrounded by two muscles, the levator and sphincter ani. 1. The *levator ani* is of considerable strength, and arises from the fascia lining the pelvis. Its fibres pass backward and upward, and terminate on the walls of the rectum under cover of the sphincter ani. 2. The *sphincter ani* is very powerful, and arises from the under surface of that caudal vertebra which is situated directly above the anus, its origin being interposed between those of the depressors of the tail. The muscle is two inches in breadth, and invests not only the extremity of the rectum but also the anal glands together with the pouch into which these open. It is inserted into the skin midway between the anus and scrotum. By means of this arrangement the sphincter ani acts not only as such upon the anus and anal-gland pouch, but also as a compressor of the anal glands. The gland-pouch resembles the corresponding structure in the female, being transversely oval in form. The anal glands are two in number, one being placed on each side of the rectum. They are oval in form and nodulated on the surface. Each measures $1\frac{1}{4}$ inch in length and $\frac{1}{2}$ inch in greatest breadth. They are thus considerably smaller than the corresponding glands in the female, in which they measure $2\frac{1}{2}$ inches in length and $1\frac{1}{2}$ inch in breadth. The gland consists of a secreting wall $\frac{1}{8}$ inch in thickness, which limits a central cavity. From the posterior extremity of this cavity a duct passes off and opens into the corresponding angle of the anal pouch. The cavity of the gland was filled with a thick secretion, which differed from that of the female in being of a blackish colour and in being destitute of the very offensive odour characteristic of that sex. In addition to these larger glands a belt of isolated follicles extends across the bottom of the anal pouch. They pour their secretion into the latter by means of the little apertures above described.

Bladder and Urethra.—The bladder is regularly pyriform and of small size, measuring 4 inches in length. As in the female, it passes gradually into the urethra, so that it is difficult to say where the one ends and the other begins. It is completely covered by peritoneum as far back as the openings of the ureters, and is attached to the pelvic and abdominal walls by reflections of that membrane. The ligaments thus formed are three in number, two being superior and one inferior. Each superior ligament is attached by one extremity to the superior and supero-lateral pelvic wall, and by the other to the lateral aspect of the bladder. Each consists of a double fold of peritoneum, in the anterior or free margin of which is placed the fibrous cord formed by the obliterated hypogastric artery; and crossing the inner side of the latter from before backward as they enter the pelvis are the ureter and the vas deferens, the ureter being uppermost. The inferior vesical ligament is sickle-shaped, and consists of an elongated fold of peritoneum, which extends between the ventral surface of the bladder and the anterior abdominal wall as far forward as the umbilicus. The ureters are remarkably thick and muscular, and open into the base of the bladder half an inch from the orifice of the urethra. The urethra extends from the bladder to the extremity of the penis, and consists of two portions, a membranous and a spongy. The membranous portion lies within the pelvic cavity, and reaches from the neck of the bladder to the bulb of the urethra. It measures 3 inches in length, and is surrounded between the openings of the vasa deferentia and the bulb by a thick layer of circularly arranged muscular fibres, the superficial fibres being attached to the peritoneal fold which intervenes between the bladder and rectum, whilst the deeper fibres are confined to the urethral wall. On slitting open this portion of the canal a well-marked longitudinal fold of mucous membrane is seen to extend along its floor from the neck of the bladder as far as the middle, in length, of the membranous part of the urethra, where it gradually disappears. Upon the summit of this fold, and 1 inch in front of the neck of the bladder, is a circular opening $\frac{1}{8}$ of an inch in diameter. This opening is the mouth of a very minute recess, on the fundus of which the two vasa deferentia terminate. The recess evidently represents the vesicula prostatica, but does not, so far as I could ascertain, form a central *cul-de-sac* extending beyond the openings of the vasa, as it does in another species of this genus. The prostate gland is altogether absent—a fact difficult to reconcile with Professor Flower's observation, that in a preparation of the male organs of *H. crocuta* in the Museum of the Royal College of Surgeons this gland measures "half an inch in length and rather less in breadth".

The spongy portion of the urethra lies within the penis, and measures 8 inches in length. It is surrounded by a layer of erectile

¹ Since the above was in type I have had, through the kindness of Professor Flower, an opportunity of examining the organs from which his description was taken, and can bear testimony to the truth of his observations regarding the presence of a prostate gland. It consisted of two distinct masses, each measuring half an inch in length and a quarter of an inch in breadth, the ducts of

tissue, which is of considerable thickness where it forms the bulb, but is thin elsewhere. Opening into the bulb are the ducts of Cowper's glands.

Testicles and Vasa deferentia.—The testicles are lodged in the non-pendulous scrotum, which is divided into two distinct compartments by a median septum. Each compartment is lined by a tunica vaginalis, which is reflected over the testicle. The cavity of the sac is continuous at the abdominal ring with that of the peritoneum, the communication between them remaining pervious. The testicle is oval in form, and measures $1\frac{1}{4}$ inch in length. The epididymis lies along its lower side, and is expanded above and below to form the globus major and minor. The latter is nearly as large as the former; and the so-called body of the epididymis is consequently reduced to a mere rudiment. The vas deferens, continuous with the globus minor, passes through the inguinal canal, enters the pelvic cavity, where it lies between the layers of the superior ligament of the bladder, and finally sinks into the muscular wall of the membranous portion of the urethra to terminate along with its fellow on the floor of the vesicula prostatica as already described. There are no vesiculæ seminales.

Cowper's Glands.—These are two in number and of large size. Each is placed alongside of the membranous portion of the urethra, in the interval between the levator ani and ischio-cavernosus muscles. Each gland is pyriform, and measures $1\frac{1}{4}$ inch in length, and $\frac{5}{8}$ of an inch in greatest breadth. The base is directed forward; and from the apex is given off a duct $\frac{3}{4}$ of an inch in length, which opens into the roof of the bulbous portion of the urethra. The glands are solid; and each is provided with a capsule of pale muscular fibres.

Penis.—This organ is composed of two corpora cavernosa together with a corpus spongiosum. The former consist of two bands of erectile tissue flattened from side to side as in the clitoris of the female, and united along the middle line. Each is attached to the ischium just in front of the tuberosity of that bone, to form the crus, and unites with its fellow opposite the posterior extremity of the pubic symphysis. The corpus spongiosum is perforated by the urethral canal, and expands anteriorly and posteriorly to form the glans and the bulb. With the exception of these portions, this mass of erectile tissue is thin and contributes no great thickness to the wall of the urethra. The bulb is large and prominent, and is invested by the fibres of the bulbo-cavernosi muscles. The corpus spongiosum of the male therefore differs from the corresponding structure in the female, inasmuch as in the latter this body is divided into two lateral halves which are situated altogether *above* the urino-genital canal, whilst in the former they have coalesced to form a

which open into a little recess on each side of the utriculus. As this animal was *known* to be at least twenty-four years of age, whilst my specimen was not adult, it is *possible* that by reason of their small size the prostate glands of the latter may have escaped my observation. In Mr. Flower's specimen the other generative glands were each twice as large as in my own.

single mass surrounding the canal of the urethra. Further, in the female the corpora spongiosa take no part in the formation of the glans clitoridis, whilst in the male the glans penis is formed by the spongy body. The penis, formed as just described, measures 8 inches in length from the bulb of the urethra to the apex of the glans.

Muscles of Penis.—Of these there are three which are bilateral, and one which is common to both sides. (1) The *ischio-cavernosus* or *erector penis* is very strong, and arises from the ischium immediately in front of the tuberosity. The fibres pass forward and are inserted into the corresponding corpus cavernosum close to the junction of the latter with its fellow on the opposite side. The muscle covers the crus penis. (2) The *bulbo-cavernosus* is also strong, and arises from a median tendinous band which separates it from its fellow. The fibres pass transversely outward so as to cover the bulb of the urethra, and are inserted into the corpus cavernosum along the inner border of the preceding muscle. (3) *Retractor penis*. In my paper on the female organs of *H. crocuta* I expressed my belief that the retractors of the clitoris probably arise from either the ischium or pubis. I am now satisfied from my examination of those of the male that such is not the case, but that in both sexes they arise from the lower surface of the sacrum. In the male each retractor is a broad but thin muscle which, arising from the pelvic surface of that bone, passes backward and downward and reaches the side of the rectum. Some of the fibres terminate on the gut, where they lie under cover of the levator ani; but the greater number form a narrow riband-like muscle, which passes downwards and extends along the under-surface of the penis in contact with its fellow to be inserted, as in the female, into the corpus cavernosum just behind the glans. (4.) *Elevator urethræ*. The muscle so named is very strong, being nearly as thick as the erector. It is a flattened band, and arises from the inner surface of the ischium 1 inch in front of the tuberosity. The fibres pass downward and forward, and terminate below the angle formed by the junction of the membranous and spongy portions of the urethra on a tendon which is common to it and to the muscle of the opposite side. Lying, as it does in the normal position of the animal, *below* the urethra, this tendon when the muscular fibres contract will tend to elevate and at the same time to compress the urethral canal. A large artery, vein, and nerve derived from the pudics pass together along the outer side of each cavernous body as in the female, and terminate close to the glans. Another artery of large size, also derived from the pudic trunk, passes into the crus penis of each side, and apparently supplies the erectile tissue.

Comparison of the Male Organs of allied Species.—Having now described the male organs of *H. crocuta*, it may be well to compare them with those of closely allied species. The number and arrangement of the anal glands is similar in both sexes of this species; and therefore there is little to add to what I have already said regarding them in my communication on the female organs. In my descrip-

tion of these glands in the latter sex I pointed out that in respect of them *H. crocuta* agrees more closely with *Proteles* than with any species of its own genus, and may merely add that the present dissection has enabled me to confirm Dr. Murie's observation¹ that in the male animal as in the female an anal-gland pouch is present. Mr. Busk² had previously convinced himself "that no trace of a pouch between the root of the tail and the anus exists, at any rate in the male of this species;" and Dr. Murie, in deference to Prof. Kaup's³ attempt to classify the Hyænas in accordance with the presence or absence of this pouch, was not prepared to deny that it might *occasionally* be absent in the male. I think this matter may now be considered settled, and may merely observe that Goldsmith⁴ appears to have been aware of the presence of this pouch in every species of *Hyæna* before any of the authors referred to had written on the subject.

With reference to the male organs of allied species, I find that Daubenton⁵ describes and figures those of *H. striata*; and these are also referred to by John Hunter⁶ and Owen⁷. Cuvier⁸ gives an account of the male organs of *Hyæna* without indicating the species to which they belong; but from the agreement between his observations and those of the authors just named, I presume that *H. striata* formed the subject of his investigations. Of the male organs of *H. brunnea*, so far as I can ascertain, we know nothing; but of those of the closely allied genus *Proteles*, Prof. Flower⁹ gives an accurate description. *H. striata* and *Proteles* agree with *H. crocuta* with respect to the form and position of the scrotum, the form of the testicle, and the absence of vesiculæ seminales, whilst they differ from the last-named species in the possession of a prostate gland. Mr. Flower, it is true, refers to the presence of a prostate gland in *H. crocuta*¹⁰; but of the absence of this in the specimen I examined I was careful to convince myself; and until further observations are made, it is impossible to reconcile these opposing statements regarding a matter of fact. In *H. striata* the prostate is large and consists of two kidney-shaped lobes, whilst in *Proteles* it consists of a single mass of large size having "the appearance of a bilobed disk." Cowper's glands are large and of the same form in all three species, which likewise agree in the form of the bladder and the very muscular character of the ureters. With respect to the vesicula prostatica, Leuckart¹¹ describes and figures it in *H. striata* as a minute flask-shaped *cul-de-sac* projecting beyond the urethral wall and lying in the interval between the lobes of the prostate. He says, moreover, that in that animal it does not open into the urethra.

¹ Trans. Zool. Soc. vii. p. 503.

² Journ. Proc. Linn. Soc. vol. ix. p. 71.

³ Isis, 1828, p. 1144.

⁴ Animated Nature, "Hyæna."

⁵ Buffon's Hist. Nat. tom. ix.

⁶ 'Essays and Observations,' by Owen, vol. ii. p. 58.

⁷ 'Anatomy of Vertebrates,' vol. iii. p. 671.

⁸ 'Anatomie Comparée,' vol. v.

⁹ Proc. Zool. Soc. 1869, p. 491.

¹⁰ Ibid. p. 493.

¹¹ 'Cyclopædia of Anatomy,' vol. iv. Art. "Vesicula prostatica."

Mr. Flower found no distinct uterus masculinus in *Proteles*; but as he refers to a median ridge on the floor of the urethra, in which he could detect a very minute aperture, the arrangement appears to be very similar to that described above in *H. crocuta*. In respect therefore of the form of the vesicula prostatica, *H. crocuta* agrees more closely with *Proteles* than with *H. striata*, differing from the latter inasmuch as the vesicula does not project beyond the urethral wall, and in the fact that it communicates with the canal of the same. According to Leuckart it is an extremely rare occurrence that the vasa deferentia open into the vesicula prostatica; but this is certainly the case in *H. crocuta*. The penis of the Spotted Hyæna closely resembles that of *H. striata* and of *Proteles*, differing only from these in the absence of a conical body of cartilaginous consistence which has been described by Cuvier in the glans penis of the former and by Professor Flower in that of the latter. The glans penis in all of them is invested by small recurved spines.

Comparison of the Male and Female Organs of H. crocuta.—When describing the female organs, I remarked that “the arrangement of these is such as to give them a great resemblance to those of the males in other species,” and that, if we supposed the vesicula prostatica of the latter enlarged to the size of the female uterus, we should in the absence of a prostate gland, have an almost identical arrangement of the excretory passages of both sexes. The absence, as a matter of fact, of the prostate gland in the male *H. crocuta* makes the resemblance between the male and female organs of this species even greater than I anticipated. And here I may be permitted to observe that nowhere in the group of mammals is the truth of the conclusions at which embryologists have arrived respecting the homologies of the various parts of the sexual apparatus in the two sexes so beautifully shown as in the animal under consideration. Did any doubt remain regarding the similarity of plan upon which these are built up, it would be at once dispelled by an inspection of the sexual organs of *Hyæna crocuta*. In both sexes there is a short urethra opening close to the mouth of the uterus, which organ, in accordance with functional requirements, is of large size in the female, but is reduced to a minimum in the male. In both there is a urino-genital canal extending from the junction of the urinary and sexual canals to the extremity of the penis or clitoris, according to sex; and in both there are two Cowperian glands of large size opening into that canal close to the root of the penis or clitoris. A comparison of the internal genital organs of the two sexes proves conclusively that the lower part of the so-called prostatic, together with the membranous portion of the male urethra, are homologous with the commencement of the urino-genital canal of the female, which canal, in the majority of mammals, is so metamorphosed to form the vestibule, that its homologue in the other sex is by no means readily recognizable. This homology is further substantiated, in the animal we are considering, by the size and form of Cowper’s glands, and the points of entrance of the ducts of these into the urino-genital canal in each sex. Lastly, the homology of the so-

called spongy portion of the male urethra with that portion of the urino-genital canal which, in the female, lies in relation to the clitoris, is manifest. The erectile organ is of the same size, and constructed upon the same plan, in both sexes, the only difference being that in the female the urino-genital canal is not surrounded by the erectile tissue of the corpus spongiosum as is the case in the male, this difference being due to the fact that in the latter the essentially bilateral spongy bodies have coalesced in the middle line, whilst in the female, in accordance with physiological requirements, they remain distinct throughout life, and do not surround the sexual canal. In the female, moreover, and associated with this arrangement, there is a complete absence of the elevator urethræ and bulbo-cavernosi muscles.

It may be well now to ascertain whether the examination of this animal throws any light upon the subject of the probable homologues of the vagina and uterus in the male mammal. The majority of embryologists (among whom I may mention the names of Leuckart, Kölliker, and Allen Thomson) are now agreed that the so-called utriculus of the male mammal represents both the uterus and vagina of the other sex, these organs being formed by the coalescence of the ducts of Müller. I have, however, in a previous paper remarked concerning the corpus uteri of the female *H. crocuta*, "That the whole of this is to be regarded as corpus uteri, and not as constituting any portion of the vagina, is proved by the absence of any constriction in its interior which might correspond to an os uteri, the tubular body of the uterus remaining of the same calibre, and having the walls of uniform thickness down to its opening into the urino-genital canal." It is evident therefore that in the female *H. crocuta*, the vagina being altogether absent, we must conclude that in the male of this species the utriculus represents the uterus alone, and not the uterus and vagina together. The same remark holds good, so far as I can ascertain, of only one other placental mammal—that is, of the Indian Elephant, in the female of which, as Mayer¹ pointed out, the vagina is altogether absent, and the uterus opens directly into the urino-genital canal. In the male, therefore, of that animal, as in that of *H. crocuta*, the utriculus, as shown by Leuckart², clearly corresponds to the uterus, and to the uterus alone, of the female. With reference to the homologue of the prostate gland in the female mammal, this, according to Prof. Allen Thomson³, is to be looked for in tissue uniting the urethra with the vagina. We might therefore be justified in expecting that in those animals in the female of which the lower ends of the Müllerian ducts unite to form the uterus and not the vagina, the prostate gland would be absent in the male. Such is certainly the case in *H. crocuta*; but that it would be erroneous to accept this as a general law is proved by a reference to the Elephant, in which, although the vagina is absent in the female, the male nevertheless possesses prostate glands of con-

¹ Nova Acta Acad. Cæs. Leop.-Car. tom. xxii. p. 38.

² 'Cyclopædia of Anatomy,' vol. iv., Art. "Vesicula prostatica."

³ Quain's 'Anatomy,' 8th edit. vol. ii. p. 826.

siderable size. There appears, indeed, upon consideration, to be no reason why these glands should not be present in the males of those species the females of which want the vagina, as well as in those in which that organ is present, seeing that in both cases we have to do with the tissue surrounding the lower ends of the Müllerian ducts.

Turning now to the external genital organs, I have before directed attention to the very close resemblance which in respect of these the male bears to the female, the so-called scrotal pouches and clitoris of the latter closely simulating the scrotum and penis of the other sex. After a very minute examination of these parts in both sexes I have only been able to recognize the following by no means very evident points of distinction between them: (1) In the female the diameter of the free portion of the clitoris, including the prepuce, is greater than in the male, measuring $1\frac{1}{2}$ inch in the former, and 1 inch in the latter. (2) The aperture at the extremity of the clitoris of the female is slightly larger and much more dilatable than the corresponding aperture in the male. This difference depends on the fact that the corpus spongiosum in the male forms the glans penis and completely surrounds the urethral aperture, whilst in the female the upper portion only of the glans is composed of erectile tissue, its lower portion being formed by the walls of the urino-genital canal. (3) The glans penis of the male is covered with recurved spines, whilst the glans clitoridis of the female is devoid of these. (4) In the male the cutaneous surface immediately behind the free portion of the penis is covered with hair, whilst in the female the corresponding space is dotted with the little cutaneous depressions I formerly described, and is devoid of hair.

It will at once be seen that these points of distinction are slight, and are not such as would enable one to decide the sex of the animal in the absence of such an examination as is well nigh impossible so long as the animal is alive.

Bisexual Nature of the Hyæna according to the Ancients.—And this leads me to observe, what I formerly stated, that the consideration of these facts may serve to explain the ideas which were common among the ancient Greeks regarding these animals, namely that they were hermaphrodites. Since the date of my former communication, I have endeavoured to come to some conclusion regarding the origin of this apparently extraordinary belief, with the result that it appears to me that a belief which in our day would rightly be considered altogether absurd, by no means deserves to be so characterized when viewed in the dim light of the knowledge possessed by the ancients respecting these animals. These people had apparently, either directly or indirectly, ascertained certain facts regarding the sexual organs of the Hyæna, which, in the absence of more definite knowledge, almost compelled them to adopt what I may call the bisexual theory regarding them—a view which, as I formerly stated, still obtains among the imperfectly educated Boors of South Africa. Among the Greeks, Aristotle¹ (B.C. 384) appears to have been the first who really investigated the sexual organs of the Hyæna;

¹ 'Historia Animalium,' vi. 32.

but that the genus was well known before his time is proved, first, by the fact that Herodotus¹ (B.C. 484) speaks of the animal as being met with in the Libyan desert, and, secondly, that the view in accordance with which each individual was bisexual, was current before the time of Aristotle, who takes pains to show its absurdity. At a later date Pliny² reasserts the bisexual nature of these animals; and his assertion is repeated by Ælian³. As, however, with one exception, to which I shall by-and-by refer, the observations of the last two historians do not contain any thing of importance which had not been previously stated by Aristotle, we may confine ourselves to a criticism of the writings of the latter; and by doing so I think we shall throw some light on the origin of the view in question. Aristotle says⁴:—"The Hyæna resembles a Wolf in colour, but is more shaggy, and its back is provided with a mane. It is said that it has the genital organs of both sexes at once; but this is not the case. Its male organ resembles that of the Wolf and Dog; and it has what resembles a female organ under the tail. But this last, although similar to the female organ in form, is imperforate. Underneath this again is the fæcal passage. The female Hyæna has this same so-called female organ situated as in the male, just under the tail; but it is imperforate. Next to this is the fæcal passage; and under this again is the true female organ. The female Hyæna, moreover, possesses an uterus like other female animals. The female Hyæna is rarely caught. Hunters maintain that for ten males they catch but one female." With regard to this passage, the first question that arises is as to the particular species of Hyæna which Aristotle himself examined. There can, I think, be no doubt that it was either *H. brunnea* or *H. striata*, but most probably the latter. His description of the female organs is such as enables us to decide that it was certainly *not H. crocuta*, inasmuch as he says that the gland-pouch had been mistaken for the female organ, showing that the former had some resemblance to the latter. But the female organ of *H. crocuta* bears no resemblance whatever to the gland-pouch; therefore it must have been the female organ of another species to which he referred. In favour of *H. striata* is (1) his observation that the animal is provided with a mane, which, as we know, is more evident in the Striped Hyæna than in *H. brunnea*; and (2) the geographical distribution of the two species—the Striped Hyæna being found in abundance in Northern Africa, with the topography and productions of which the Greeks were well acquainted, whilst *H. brunnea* is confined to the central and southern districts of that continent, districts with which the Greeks were by no means so familiar. But if we come to the conclusion that either *H. striata* or *H. brunnea* formed the subject of Aristotle's investigation, I would point out that in denying, as the result of his observations, the bisexual character of either of these animals, he is attempting to refute a hypothesis the origin of which (as referring to them) it is impossible to explain, seeing that the male and female external organs of

¹ Rawlinson's Herodotus, vol. iii. p. 172.

² Pliny, viii. 30.

³ 'Historia Animalium,' i. 25.

⁴ *Loc. cit.*

both species differ widely in appearance, and that consequently the sexes of each are readily distinguishable one from the other.

If this be granted, we need not further attempt to explain an assertion, the origin of which has no foundation in *fact*. But that this hypothesis did originate with reference to either of these species I am not prepared to admit, as it appears to me that the bisexual character attributed to the Hyæna allows of a rational explanation if we regard that character as referring not to either *H. striata* or *H. brunnea*, either of which Aristotle *may* have examined, but to *H. crocuta*, which he certainly did *not* examine. And as further showing that in all probability Aristotle unwittingly mixed up and confounded reports regarding totally distinct animals, I would direct attention to two of the sentences above quoted, in one of which he says, "It is said that it (the Hyæna) has the genital organs of both sexes at once;" and in another "The female hyæna is rarely caught. Hunters maintain that for ten males they catch but one female." Passing over the evident inconsistency of these two statements, I have already shown that the first is inexplicable when applied to either *H. striata* or *H. brunnea*; and, in like manner, the second is equally devoid of meaning when regarded as having reference to either of these species, inasmuch as we have no reason to believe that the proportion in number of the sexes is different in either of them from what it is in other carnivorous mammals, or that the female of either is more difficult of capture than the male. We conclude, therefore, that if the bisexual theory of the ancients regarding the Hyæna had any foundation in fact at all, such fact had reference not to either *H. striata* or *H. brunnea*; and by a process of exclusion we are compelled to regard it as having reference to *H. crocuta*. I have already shown that it is almost impossible to distinguish the female of this species from the male by the mere inspection of the external genital organs; and in this fact lies, as I believe, the explanation of the views held by the ancients regarding these animals. This explanation is moreover borne out by Aristotle's observation that "the female Hyæna is rarely caught," a fact which Pliny also records. The latter historian makes a further, with reference to the present inquiry important observation which is not to be found in the writings of Aristotle. He says, "It is a matter of common belief that the Hyæna is bisexual, and that it is male and female in alternate years." It is evident here that Pliny, like Aristotle, mixes up distinct reports concerning the animal, as it requires no elaborate argument to show that were the animal bisexual it did not require to change its sex every year. Be this as it may, it appears to me that if we consider these various statements as referring to *H. crocuta*, the origin of all of them admits of a rational explanation. It might well be that the ignorant traders who trafficked with the natives of the interior of the African continent, observing that all, or at least the majority, of the Hyænas which they encountered were apparently males, should have experienced some difficulty in accounting for the continuance of the species, and have had recourse to the view that each animal was bisexual. It is not improbable that, as Aristotle explains, this view

may have been borne out by the presence of an anal pouch, which, according to him, was mistaken for the female organ—an explanation which is rational enough if we consider that *H. crocuta* formed the subject of the hypothesis, but one which, as I have already shown, loses all its force if we regard it as referring to either of the other species of *Hyæna*. I would add that the other statements of the historians already quoted, to wit that the *Hyæna* changes its sex every year, and that the female is rarely caught, are equally explicable in accordance with this view. The first of these I regard as another attempt to solve the problem of generation, seeing that the animals, to the eye of the observer, were uniformly of the male sex; whilst the latter is merely a statement of fact. It may be urged that the geographical distribution of *H. crocuta*, confined as that animal is to the region of Africa lying south of the Sahara¹, and consequently beyond the ken of the Greeks, is against this view. But I may be permitted to point out that it is almost certain that in their time, as now, trading caravans from the coast visited these districts and conveyed to the Greeks information regarding the animals which inhabited them; otherwise it is impossible to account for the accurate knowledge which Herodotus undoubtedly possessed regarding the African continent as far to the south-west as the valley of the Niger². In all probability the statements of travellers regarding the bisexual nature of the *Hyæna*, originating with *H. crocuta*, were transferred by the Greeks to *H. striata*, with which they were better acquainted—statements which when taken as referring to the latter species are absolutely devoid of meaning, but which, when regarded as applying to the former, admit, as it appears to me, of a rational explanation.

I have, in conclusion, to acknowledge the kindness of Dr. Alfred Young in preparing the illustrations for this paper.

EXPLANATION OF THE PLATES.

PLATE XXIV.

View of the male perineum and penis of *Hyæna crocuta*. From above downwards are seen the orifice of the anal-gland pouch, and anus; below the latter is the scrotum, together with the bare perineal integument; lowest of all is the penis, surrounded by its prepuce.

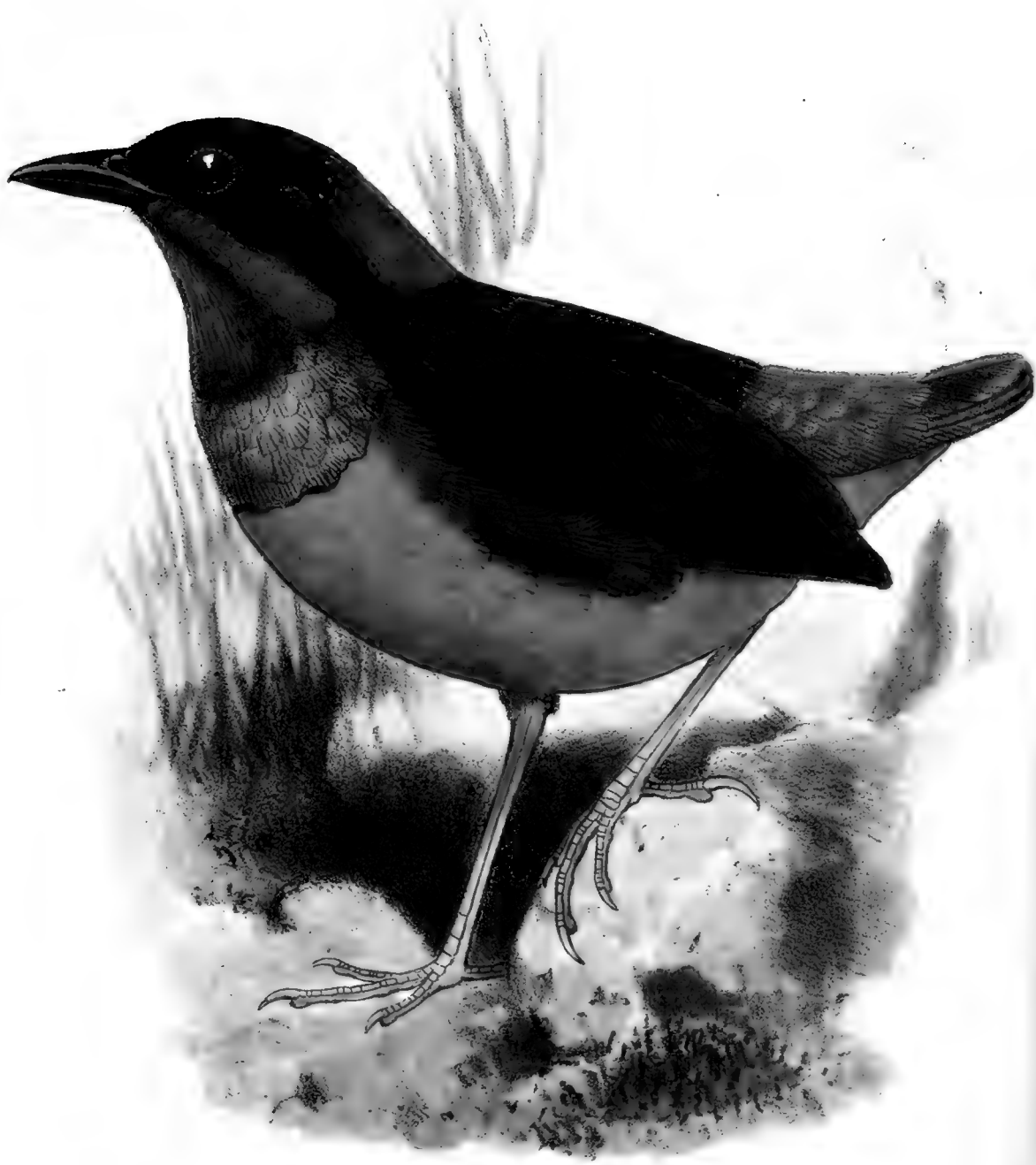
PLATE XXV.

- Fig. 1. Male generative organs and extremity of rectum of *Hyæna crocuta*. G. P, glans penis; Pr, prepuce; S, scrotum seen from the side; P, penis; C. P, crura penis, covered by the ischio-cavernosi muscles; B. U, Bulb of urethra, covered by the bulbo-cavernosi muscles; R. P, retractor penis muscle; B, bladder; UR, urethra; T, T, testicles, that on the right side lying in its serous sac; V. D, vasa differentia; R, rectum; A. G, anal gland; L. A, levator ani muscle.
- Fig. 2. Intrapelvic portion of urethra laid open, showing elevated fold of mucous membrane on its floor, together with the opening of the utriculus on the summit of this fold.
- Fig. 3. Glans penis and prepuce of *Hyæna crocuta*. The prepuce is retracted to show the small recurved spines which invest the glans.

¹ 'Geographical Distribution of Mammalia,' by Andrew Murray.

² Heeren's 'Ancient Nations of Africa,' vol. i. p. 192.





W. S. 1878

W. S. 1878

PITTA KOCHI

3. Contributions to the Ornithology of the Philippines.—
No. VIII. On some Luzon Birds in the Museum at
Darmstadt. By ARTHUR, MARQUIS OF TWEEDDALE,
F.R.S., President of the Society.

[Received March 27, 1878.]

(Plate XXVI.)

Professor Koch, of Darmstadt, through the obliging intervention of Dr. Brüggemann, has kindly sent to me for examination a small number of birds collected in the vicinity of Manilla by Herr v. Othberg. Though few in number, some of them belong to species of which the Philippine habitat has not hitherto rested on indisputable evidence, while two of them have not before been known as being migrants to the archipelago.

COLLOCALIA FUCIPHAGA.

Hirundo fuciphaga, Thunb. Act. Holm. xxxiii. p. 151, t. iv., "Java;" Walden, 'Ibis,' 1874, p. 135.

Collocalia linchi, Horsf. & Moore, Cat. E.I. C. Mus. i. p. 100. no 123, "Java."

A single example of a species of the genus *Collocalia* was sent by H. v. Othberg to the Darmstadt Museum, and, I am assured by Dr. Brüggemann, was obtained in Luzon. It is not separable from the Javan species, *C. linchi*, H. & M., i. e. the true *H. fuciphaga* of Thunberg. No species of the genus has hitherto been known to inhabit Luzon; nor has this species been found in any other Philippine Island.

TURDUS OBSCURUS (92).

The Philippine habitat of this Thrush has hitherto rested solely on Prince Bonaparte's authority (Coll. Delattre, p. 28). Three examples from the vicinity of Manilla are sent to me by Professor Koch.

TURDUS CHRYSOLAUS (93).

The certainty of this Thrush being an inhabitant of the Philippines turned on the authenticity of a skin in Mr. Gould's collection (cf. Sclater, 'Ibis,' 1863, p. 197). Four examples from Manilla are in the Darmstadt Museum.

TURDUS VARIUS.

Turdus varius, Pallas, Zoogr. R.-Asiatica, i. p. 449.

Professor Newton (Hist. Brit. Birds, pt. iv. p. 254) has remarked that Mr. Gould had received an example of White's Thrush from Manilla. While there could be no possible doubt of the strict accuracy of Professor Newton's determination of the species, I did not

feel quite confident that the origin of the specimen was indisputable (for I had also examined it); and the species was therefore not included by me in my list of Philippine Birds. Professor Koch, however, sends me three examples from Manilla.

ERYTHROPITTA KOCHI. (Plate XXVI.)

Pitta kochi, Brüggemann, Abhandl. naturw. Ver. zu Bremen, v. p. 65, t. iii. f. 6.

Professor Koch has kindly sent me the type specimen of this *Pitta*, from which the accompanying figure is taken. The species is undoubtedly distinct from all the other known members of the subgenus. It is almost as large as *Hydrornis nipalensis*. The tarsus measures nearly two inches. Its specific characters and points of difference are fully detailed by its describer (*l. c.*).

ACROCEPHALUS FASCIOLATUS.

Acrocephalus fasciolatus, G. R. Gray, P. Z. S. 1860, p. 349.

Acrocephalus insularis, Wallace, 'Ibis,' 1862, p. 350.

Calamoherpe fumigata, Swinhoe, P. Z. S. 1863, pp. 91, 293.

Calamoherpe subflavescens, Elliot, P. Z. S. 1870, p. 243.

A single example from Manilla in the yellow under-plumage of *A. fasciolatus*, with which species I identify *A. insularis*. New to the Philippines.

ANTHUS GUSTAVI.

Corydalla gustavi, Swinhoe, P. Z. S. 1871, p. 366; Brüggemann, Abhandl. naturw. Ver. zu Bremen, v. p. 67; Sharpe, Tr. Linn. Soc. ser. 2, Zool. i. p. 338.

Dr. Brüggemann, who first made known the occurrence of this bird in the Philippines (*l. c.*), correctly identified the same example Professor Koch has sent to me. It was obtained by H. v. Othberg near Manilla. Some months later, Mr. Sharpe (*l. c.*) made known that Dr. Steere had discovered the same species in the island of Basilan.

ANTHUS MACULATUS.

Anthus maculatus, Hodgs., Gray, Zool. Misc. p. 83; Tweeddale, P. Z. S. 1877, p. 696.

Two examples from Manilla are sent by Professor Koch. Mr. Everett also procured it at Monte Alban (*cf.* Tweeddale, *l. c.*).

4. Reports on the Collections of Birds made during the Voyage of H.M.S. 'Challenger.'—No. IX. On the Birds of Antarctic America. By P. L. SCLATER, M.A., Ph.D., F.R.S., and OSBERT SALVIN, M.A., F.R.S.

[Received April 10, 1872.]

In this report the birds collected at the island of Juan Fernandez, at various points during the subsequent passage along the coast of Patagonia, and at the Falkland Islands are noticed.

The 'Challenger' was at Juan Fernandez from the evening of the 13th to the evening of the 15th of November, 1875, and reached the coast of Patagonia on the 31st December, at Port Otway, east of Cape Tres Montes. On the 1st of January, 1876, a party landed on Penguin Island in Messier's Channel; and the same evening the ship arrived in Cove Bay. On the 2nd January parties were landed on Middle Island, on the 3rd at Gray Harbour, on the 4th at Grappler Harbour, on the 5th and 6th at Tom Bay, near the Trinidad Passage; and small collections were made at each place. On the 8th of January the ship arrived at Porto Bueno, and remained there till the 10th. The same evening a party was landed at Isthmus Bay, and a few birds were obtained. From the 11th to the 13th the 'Challenger' remained at Port Churrucha, and proceeded thence to Port Famine. From the 14th to the 17th she was at anchor off Sandy Point, whence she proceeded through the straits, and anchored about 10 A.M. on the 18th off Elizabeth Island. Leaving the Magellan's Straits, the 'Challenger' arrived at Port Stanley, Falkland Islands, on the 23rd of January, 1876, and remained altogether about two weeks at the Falklands.

During this entire period 169 specimens of birds were collected, which are referable to 41 species.

The ornithology of this part of the world is well known to us from the researches of Darwin, Cunningham, Philippi and Landbeck, and other naturalists¹. It was not to be expected, therefore, that any novelties would be found during such a cursory passage along the coast.

1. *TURDUS FALKLANDICUS*, Q. et G.; Scl. et Salv. Nomencl. p. 2.

619-621, males, }
622-625, females, } Juan Fernandez.

"Eyes brown, bill and legs yellow, feet a little darker yellow."

647, male, }
648, female, } Gray Harbour, Messier's Channel.

"Eyes brown; stomachs had berries."

685, male, }
686, female, } Port Churrucha.

"Eyes brown; stomachs had berries."

¹ See my address on Geographical Zoology in Rep. Brit. Assoc. 1875, p. 105, and my list of papers on the Birds of Chili, P. Z. S. 1867, p. 108.

The occurrence of this Thrush in Juan Fernandez is new to us¹. The skins from that island do not differ from continental specimens. Specimens 647, 648, from Gray Harbour, Messier's Channel, and 685, from Port Churrucha (obtained in the month of January), are in nestling-plumage. The lower surface is thickly spotted with black; and the back-feathers carry light fulvous shaft-stripes, and are tipped with black.

2. *HIRUNDO MEYENI*, Cab.; Scl. et Salv. Nomencl. p. 14.

709, male,
710, 711, females, } Sandy Point.
"Eyes black; stomachs had insects."

3. *PHRYGILUS GAYI* (Eyd. et Gerv.); Scl. et Salv. Nomencl. p. 31.

662, 663, females, Porto Bueno.
"Eyes red; stomachs had sand and grubs."

4. *PHRYGILUS MELANODERUS* (Quoy et Gaim.); Scl. et Salv. Nomencl. p. 31.

727, male, Falkland Islands.
"Eyes black; stomach had seeds."

5. *ZONOTRICHIA CANICAPILLA*, Gould; Sclater, 'Ibis,' 1877, p. 47, pl. i. fig. 1.

702, 703, females, Sandy Point.
"Eyes brown; stomachs had insects."

These skins are of young birds, and in a stage in which they cannot be distinguished from *Z. pileata*; but from their locality they should belong to *Z. canicapilla*.

6. *CURÆUS ATERRIMUS* (Kittl.); Scl. et Salv. Nomencl. p. 38.

645, male, Gray Harbour.
"Eyes black; stomach had insects."

7. *CENTRITES NIGER* (Bodd.); Scl. et Salv. Nomencl. p. 44.

705-707, males, }
708, 708a, females, } Sandy Point.
"Eyes black; stomachs had insects."

8. *ANÆRETES PARULUS* (Kittl.); Scl. et Salv. Nomencl. p. 47.

665. female, Porto Bueno.
"Eyes grey."

9. *ANÆRETES FERNANDEZIANUS*, Philippi; Scl. 'Ibis,' 1871, p. 179, pl. vii. fig. 1; Scl. et Salv. Nomencl. p. 47.

606-613, males, Juan Fernandez.
"Eyes white; insects in stomachs."

¹ See article on the Land-birds of Juan Fernandez in 'Ibis,' 1871, p. 178.

10. *ELAINEA ALBICEPS* (Lafr. et D'Orb.); Scl. et Salv. Nomencl. p. 48.

688, male, Port Churrucha.

"Eyes black."

11. *TÆNIOPTERA PYROPE* (Kittl.); Scl. et Salv. Nomencl. p. 42.

704, male, Sandy Point.

"Eyes black; stomach had insects."

12. *CINCLODES PATACHONICUS* (Gm.); Scl. et Salv. Nomencl. p. 62.

629, male, }
630, female, } Port Otway.

"Eyes hazel, feet horn-colour.

641, male, }
642, young male, } Messier's Channel, Cold Harbour.

"Eyes brown."

No. 642, obtained Jan. 2, is a nestling lately flown.

13. *SCYTALOPUS MAGELLANICUS* (Lath.); Scl. et Salv. Nomencl. p. 76.

675, male, }
676, female, } Porto Bueno.

Eyes black; stomachs had insects."

680, male, Isthmus Bay.

"Eyes brown."

14. *PYGARRHICUS ALBIGULARIS* (King); Scl. et Salv. Nomencl. p. 67.

674, male, Porto Bueno.

"Eyes grey; stomach had insects."

15. *OXYURUS SPINICAUDA* (Gm.); Scl. et Salv. Nomencl. p. 62.

631, female, Port Otway,

"Eyes black; stomach had insects."

664, female, Porto Bueno.

"Eyes brown."

687, male, Port Churrucha.

"Eyes brown."

16. *EUSTEPHANUS GALERITUS* (Mol.); Scl. et Salv. Nomencl. p. 90; Scl. 'Ibis,' 1871, p. 181.

614-616, males, }
617, female, } Juan Fernandez.

"Eyes black, legs black."

677, male, Porto Bueno.

"Eyes black."

The occurrence of this Humming-bird on Juan Fernandez is now confirmed.

17. *EUSTEPHANUS FERNANDENSIS* (King); Scl. et Salv. Nomencl. p. 90; Scl. 'Ibis,' 1871, p. 180.

575-580, 582, 583, 585, 586, 588-592, males, }
593, 594, males (young), } Juan Fernandez.
595-600, 603, 605, females, }

Of 575 to 592 it is noted by Mr. Murray—"All males, eyes black, feet and bill black; insects in stomachs. This was the most abundant bird on the island apparently. It would seem to be the male of the next lot (595-605)."

Of the last-mentioned lot, Mr. Murray noted, "I think there are strong reasons for believing that these are the females of the preceding. They were several times shot together on the same tree."

There can be no question of Mr. Murray's view being correct. See my notes on this subject in 'Ibis,' 1871, p. 181.

18. *CAMPEPHILUS MAGELLANICUS* (Gm.); Scl. et Salv. Nomencl. p. 98.

667, male, }
668, female, } Porto Bueno.

"Eyes yellow, feet and bill black; stomachs had insects."

19. *CERYLE STELLATA* (Meyen); Scl. et Salv. Nomencl. p. 103.

628, male, Port Otway.

"Eyes black, feet yellowish green; stomach was empty."

638, male, Corr Harbour.

"Eyes brown; stomach had fish-bones."

649, male, Gray Harbour.

"Eyes black; stomach was empty."

20. *CONURUS SMARAGDINUS* (Gm.); Scl. et Salv. Nomencl. p. 112.

696, male, }
697-699, females, } Sandy Point.

"Eyes red; stomachs had seeds; bill and legs horn-colour."

21. *OTUS BRACHYOTUS* (Forst.); Scl. et Salv. Nomencl. p. 116.

712, male, Sandy Point.

"Eyes yellow, bill black; stomach had a mouse in it."

717, male, Elizabeth Island.

"Eyes yellow, cere yellow, bill black; stomach had remains of mouse."

22. *GERANOÆTUS MELANOLEUCUS* (Vieill.); Scl. et Salv. Nomencl. p. 119.

713, female, Elizabeth Island.

"Eyes brown; stomach had goslings; cere yellow, tip of bill black, legs yellow."

23. *TINNUNCULUS SPARVERIUS* (Linn.); Scl. et Salv. Nomencl. p. 121.

700, male, Sandy Point.

"Eyes brown, feet yellow, bill bluish; stomach had remains of mouse."

701, female, Sandy Point.

"Eyes brown, legs yellow, cere yellow, bill blue; stomach had remains of small birds."

715, 716, females, Elizabeth Island.

"Eyes brown, legs yellow, cere yellow."

These specimens all belong to the form kept distinct by Mr. Sharpe (Cat. Birds, i. p. 439) under Swainson's title *cinnamominus*. But when a large series is examined, we find so many intermediate forms between *T. cinnamominus* on the one hand, and *T. isabellinus* on the other, that it seems better to keep these three continental forms all under one specific designation. On the other hand, the insular forms *T. leucophrys* and *T. sparveriioides* of Cuba, and *T. dominicensis* of the other Antilles, seem to be fairly distinct.

24. *MILVAGO CHIMANGO* (Vieill.); *Scl. et Salv. Nomencl.* p. 122.

669, 670, females, Porto Bueno.

"Eyes brown, feet bluish grey."

695, male, Sandy Point.

"Eyes brown, bill yellowish tinge, legs blue."

25. *POLYBORUS THARUS* (Mol.); *Scl. et Salv. Nomencl.* p. 123.

679, male, Isthmus Harbour.

"Eyes brown, bill blue, cere flesh-coloured, and legs flesh-coloured."

684, male, Port Churrucha.

"Eyes brown, cere orange, legs yellow, bill bluish tinge."

26. *CATHARTES AURA* (Linn.); *Scl. et Salv. Nomencl.* p. 123.

Enops falklandica, Sharpe, Cat. Birds, i. p. 27, pl. ii.

731, female, Falkland Islands.

"Eyes brown; had remains of birds in the stomach."

We consider Mr. Sharpe's generic and specific names for this Vulture alike unnecessary.

Illiger, in his 'Prodromus' (1811), gave two types for his genus "*Cathartes*," *Vultur papa* and *V. aura*. In 1816 Vieillot made two genera, *Gypagus* for *V. papa* and *Catharista* for *Vultur aura* and *V. atratus*. *Cathartes*, however, has been generally used for the latter group; and there is, in our opinion, no reason whatever for transferring it back to the former, which has an excellent and appropriate name in *Gypagus*. There seem to us no sufficient characters to separate the red-headed and black-headed species of *Cathartes* into two genera.

As regards the Falkland-Island form of *C. aura*, which Mr. Sharpe designates *Enops falklandica*, the differential character relied upon, which is, apparently, merely the slight greyish-brown margination of the secondaries, appears to us to be insufficient.

27. *NYCTICORAX OBSCURUS*, Bp.; Scl. et Salv. Nomencl. p. 126.

655, female, Tom Harbour.

"Eyes orange, feet greenish yellow; stomach had fish.

666, female, Porto Bueno.

"Eyes orange."

737, female, Falkland Islands.

"Eyes yellow; stomach had crustacea."

28. *THERISTICUS MELANOPIS* (Gm.); Scl. et Salv. Nomencl. p. 127.

691, male, } Sandy Point.

692, female, }

Female, eyes red, feet pink, bill black.

Male, eyes yellow, bill green, legs pinkish with black scales.

29. *BERNICLA ANTARCTICA* (Gm.); Scl. et Salv. Nomencl. p. 128.

632, male, }

633, female, }

634, young, } Penguin Islands, Messier Channel.

635, young, }

"Eyes brown, feet yellow; bill of male black, of female flesh-colour; bill of young dark; feet grey-brown; stomachs had pieces of small stones, shells, and sea-weed."

736, female, Falkland Islands.

The two goslings (obtained January 1) are just changing their down, and present the black back, brown head, and barred wings and undersurface of the adult female partially developed. The sex is not noted in either of them.

30. *CHLOEPHAGA POLIOCEPHALA*, Scl.; Scl. et Salv. Nomencl. p. 128.

643, male, } Gray Harbour.

644, female, }

"Eyes brown, feet and legs yellow and black; stomachs had grass and berries."

658, female, }

659, female, }

658 *a*, young, } Tom Harbour.658 *b*, young, }

"Eyes brown, bill black, feet yellow and black."

31. *MARECA SIBILATRIX* (Poeppig); Scl. et Salv. P. Z. S. 1876, p. 395.

719, male, Elizabeth Island.

"Eyes grey, bill black, feet black; stomach had sand &c."

32. *SPATULA PLATALEA* (Vieill.); Scl. et Salv. Nomencl. p. 130.

694, male, Sandy Point.

"Eyes white, bill black, feet yellow; stomach had pebbles, &c."

33. *TACHYERES CINEREUS* (Gm.).*Tachyeres cinereus*, Scl. et Salv. P. Z. S. 1876, p. 402.*Micropterus cinereus*, Cunningham, Trans. Zool. Soc. vii. p. 493.

651, female (young), Messier's Channel.

"Eyes brown; stomach had crabs."

656, young, Messier's Channel.

"Eyes brown, feet and bill black."

657, female, Tom Harbour.

"Eyes brown, bill yellow tipped with black, feet yellow; stomach had small pieces of sand."

678, male, Straits of Magellan.

681, 682, females, Port Churrucha.

"Weighed 8 lb. and $8\frac{1}{2}$ lb."

725, 726, males (young), Falkland Islands.

"Stomach had shells from the kelp chiefly; bill black, feet yellow-brown."

There is nothing in the present series which would induce us to question Dr. Cunningham's view, that the "Flying Loggerhead" is the young of the ordinary species before it gets too heavy for flight. Such a specimen as "No. 681, young female," could evidently accomplish flight, which in large fully adult birds would be probably impossible.

In all the immature birds the bill is uniform black.

34. *COLUMBA CENAS*, Linn.

626, male, } Juan Fernandez.

627, female, }

"Eyes orange, feet red, bill black."

No doubt an introduced bird; the two specimens vary in plumage.

35. *RALLUS ANTARCTICUS*, King; Scl. et Salv. Nomencl. p. 139.

693, female, Sandy Point.

"Eyes red, bill black, feet yellow; stomach had pebbles."

36. *VANELLUS OCCIDENTALIS*, Harting.*Vanellus occidentalis*, Harting, P. Z. S. 1874, p. 451.*V. cayennensis*, Sclater, P. Z. S. 1867, p. 331; Scl. et Salv. Nomencl. p. 142 (partim).

722, male, Elizabeth Island.

"Eyes pink, legs pink, bill black at tip, pink at base."

The characters given by Mr. Harting to separate this western form from *V. cayennensis* are slight, but, we think, on the whole, sufficient to justify the employment of his name.

37. *HÆMATOPUS LEUCOPUS* (Garnot); Scl. et Salv. Nomencl. p. 143.

636, male, Penguin Islands.

"Bill red, legs flesh, eyes orange."

653, female, } Tom Harbour.
 654, young, }

"Eyes orange; stomach had mussels."

"Eyes of young were brown, bill of adult red, feet flesh-coloured; bill of young brown."

661, female, Tom Harbour.

720, male, Elizabeth Island.

"Eyes yellow, feet flesh, bill red, eyelids red; stomachs had mussels."

38. *HÆMATOPUS ATER* (Vieill.); *Scl. et Salv. Nomencl.* p. 143.

721, female, Elizabeth Island.

"Eyes yellow, feet flesh, bill red, eyelids red; stomach had mussels."

39. *EUDROMIAS MODESTA* (Licht.); *Scl. et Salv. Nomencl.* p. 143.

646, female, Gray Harbour.

"Eyes brown; stomach had insects."

660, female, Tom Harbour.

"Eyes black; stomach had insects."

673, male, Porto Bueno.

"Eyes brown; stomach had seeds and sand."

690, male, Port Fanurie.

"Eyes brown; stomach had sand."

728, male, Falkland Islands.

"Eyes brown; stomach had sandy particles &c."

40. *GALLINAGO PARAGUAË* (Vieill.); *Scl. et Salv. Nomencl.* p. 144.

671, 672, females, Porto Bueno.

"Eyes brown, feet bluish; in No. 672 the feet are yellowish."

729, male, } Falkland Islands.
 730, female, }

"Eyes brown; stomachs had worms &c."

41. *TRINGA FUSCICOLLIS* (Vieill.); *Scl. et Salv. Nomencl.* p. 145.

733, male, Falkland Islands.

"Eyes brown; stomach had sand &c."

5. Descriptions of three new Species of Birds from Ecuador.

By P. L. SCLATER, M.A., Ph. D., F.R.S., and OSBERT SALVIN, M.A., F.R.S.

[Received April. 11, 1878.]

(Plates XXVII. & XXVIII.)

Mr. C. Buckley, during his recent second expedition into the eastern valleys of the Andes of Quito, has obtained a series of birds



FRIGATEBIRD (FREGATA AEREA)





GREBE (ALLOPHEUS)



many of which are of great interest, such as *Oreothraupsis arremonops*, Jardine, *Cyanocitta pulchra*, Lawrence, and others. Three species, which appear to be new to science, we propose now to characterize.

1. BUARREMON LEUCOPIS, sp. nov.

Oleagineo-viridis, suprâ valdè saturatior ferè in nigrum transiens; alis extùs, caudâ totâ et capitis lateribus nigris, dorso ferè concoloribus; pileo castaneo; oculorum ambitu angusto albo; rostro nigro, pedibus corneis: long. tota 7·0, alæ 3·4, caudæ 3·3, tarsi 1·1.

Hab. Yauayaca, Ecuador (*Buckley*).

Mus. Salvino-Godmannico.

Obs. Species a *B. castaneicipite*, Scl., cui affinis, dorso obscuro et ciliis albis prorsus distinguenda.

2. NEOMORPHUS RADIOLOSUS, sp. nov. (Plate XXVII.)

Cristatus, suprâ æneo-niger, frontis et dorsi superioris necnon tectricum minorum plumis fasciis angustis albis aut fulvis transradiatis; tectricibus superioribus et secundariis totis extùs cum dorso inferiore saturatè castaneo-rufis; tectricibus caudæ superioribus et caudâ suprâ æneo-viridibus, caudâ parum purpureo tinctâ; subtùs omnino sordidè albus, nigro omnino et frequenter transradiatus, crisso nigricante; rostro pallidè corneo, pedibus obscurè corylinis: long. tota 19·0, alæ 6·6, caudæ rectr. med. 10·0, ext. 6·8, tarsi 2·7, rostri a rictu lin. dir. 2·0.

Hab. Intaj, Ecuador (*Buckley*).

Mus. Salv.-Godm.

Mr. Buckley sends one specimen of this remarkable Cuckoo, which, though a typical *Neomorphus*, belongs to a very distinct species of the genus, and differs from the four previously known members of this group¹ in being conspicuously banded on the lower surface of the body and round the back of the neck. In its bright chestnut-red wing-coverts it approaches to *N. rufipennis* (P. Z. S. 1849, Aves, pl. x.), but must constitute a third and separate section of the genus, as arranged by Sclater.

3. ARAMIDES CALOPTERUS, sp. nov. (Plate XXVIII.)

Suprà saturatè olivaceus, collo postico et pileo concoloribus; dorso inferiore et caudâ nigricantibus; fasciâ colli utrinque latera occupante et tectricum alarium externarum marginibus saturatè rubris; subtùs plumbeus, gulâ albâ; subalaribus nigris albo transfasciatis; primariis intùs nigricantibus; rostro viridi, pedibus rubris: long. tota 13·0, alæ 6·5, caudæ 2·3, tarsi 2·4, rostri a rictu 2·0.

Hab. Sarayacu, Ecuador (*Buckley*).

Mus. Salv.-Godm.

¹ Cf. Sclater, P. Z. S. 1866, p. 59, et Lawrence, Ibis, 1873, p. 287.

Obs. Proximus *A. saracuræ*, sed colli alarumque picturâ rubrâ, subalaribus albo-nigris neque rufo-nigris, et primariis nigricantibus nec rufescentibus sanè diversus.

This fine *Aramides*, of which Mr. Buckley has sent two specimens obtained at Sarayacu on the Rio Bobonassa, may be readily distinguished from its nearest ally, *A. saracura*, by the characters given above. Unfortunately, in our "Clavis specierum" of this genus (P. Z. S. 1868, p. 447) we have used the black and white under wing-coverts for the primary division of the genus into two sections. In this respect, however, our new species would come into the second division, although it is certainly most nearly allied to *A. saracura* of the first section.

6. On a new Species of Finch from the Feejee Islands. By OTTO FINSCH, Ph.D., C.M.Z.S., Director to the Bremen Museum.

[Received March 27, 1878.]

(Plate XXIX.)

AMBLYNURA KLEINSCHMIDTI, sp. nov.

Supra viridis, subtus lætius tincta; regione parotica viridi-flava; capistro nigro; pileo obscure cyanescente; tectricibus caudæ superioribus læte rubris; subalaribus isabellinis; rostro et pedibus corneo-rubris.

Front, fore part of cheeks to the posterior edge of eye, and chin black; vertex obscure blue; upper surface dark grass green, the same as the outer edge of the remiges, which are blackish brown, like the tail-feathers; upper tail-coverts splendid scarlet-red; underparts grass-green, much brighter and lighter than the upper parts, ear-region bright greenish-yellow; under wing-coverts isabelline; bill and feet horny yellow in the skin, in the living bird apparently flesh-coloured, nails dark brown.

Long. tota,	alæ,	caudæ,	rostr. a fronte,	tars.	dig. med.	
c. 100	63	29	14	21	15	French millim.
c. 4"	2" 5'''	1" 1½'''	6'''	8½'''	c. 6'''	English inches.

Hab. Viti-levu, Figi Islands.

Mr. Kleinschmidt, the indefatigable collector of the Museum Godeffroy, discovered this beautiful new species in the interior of Viti-Levu, in November 1877; and I have great pleasure in naming it after its discoverer. The single specimen sent to me by the Museum Godeffroy is, no doubt, an old bird: the sex is not marked. This bird belongs to the short-tailed group of Finches, which Reichenbach separated generically, s. n. *Amblynura*, but has a more elongated bill than other species of the genus.

RECEIVED
ZOOLOGICAL MUSEUM
JAN 31 1879



1878

1878

AMBLYNURUS KLEINSCHMIDTI



+







